### MCA Year 1 Semester I

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#### Practicals

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Discrete Mathematics

Class: I Sem. MCA
Branch: MCA
Schedule Per Week
Lectures: 3
Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Content of the Subject

Introduction to Discrete Mathematical Structures: Sets, Relations and functions, Sets, Types of Sets, Multisets, Operations on Sets, Relations and Properties of Relations, Representation of Relations, Equivalence Relation, Closures of Relations, Functions, injection, Surjection and Bijective mapping, Composition of functions, Introduction to characteristic functions.


Graph Theory: Types of Graphs, Path and Circuits, Eulerian Path and Circuits, Hamiltonian Path and Circuits, Shortest Path Algorithms.


Text Book:

References:
**Programming in C and C++**

Class: I Sem. MCA  
Branch: MCA  
Evaluation  
Schedule Per Week  
Lectures: 3  
Examination Time: Three Hours  
Maximum Marks: 100 [Mid-term (20) & End-term (80)]

**Content of the Subject**

**Programming Fundamentals through C:** Algorithms and Flowcharts, Data types, constants, variables, operators, data input and output, assignment statements, conditional statements, expressions, string and character handling, data validation examples. Iteration, arrays, strings processing. Defining function, function prototype, passing parameters, recursion.

**Pointers:** Definition and uses of pointers, pointer arithmetic, pointers and array, pointers and functions, pointer to pointer. Structures, union, pointers to structures, user-defined data types, enumeration.

Introduction to Dynamic Memory Allocation, command line arguments, systems calls.  
File Handling in C

**OOP Paradigm:** Characteristics of OOP, Comparison between functional programming and OOP approach, characteristics of object oriented language - objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading.

Introduction to C++, Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, input and output, conditional expression loop statements, break control statements. Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors.

Inline member functions, static class member, friend functions, and dynamic memory allocation.

**Polymorphism and Inheritance:** Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, late binding, pure virtual functions.

Single inheritance, types of inheritance, types of base classes, types of derivatives, multiple inheritances, container classes, member access control.

**Exceptions and Templates:** Exception syntax, Multiple Exceptions, Function templates, function templates with multiple argument templates. File Handling in C++

**Text Book:**
References

1. Deitel and Deitel "C How to Program", Pearson Education. 2010
4. HM Deitel and PJ Deitel "C++ How to Program", Prentice Hall, 2010
Operating system

Class: I Sem. MCA
Branch: MCA
Schedule Per Week
Lectures: 3
Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Content of the Subject

**Introduction**: Definition and types of operating systems, Batch Systems, multi programming, time sharing, parallel, distributed and realtime systems, Operating system structure, Operating system components and services, System calls, system programs, system boot.

Process Management: Process concept, Process scheduling, Cooperating process, Threads, Inter process communication, CPU scheduling criteria, Scheduling algorithms, Multiprocessor scheduling and Algorithm evaluation.

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


**File system and secondary storage structure**: file concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery , Swapspace management, Dist reliability.

**Case Study**: Windows NT-Design principles, system components Environmental Subsystems, File system, Networking and program interface.

**Text Book:**


**References:**

Contents of the Subject

**Basic Building Blocks:** Gates, Boolean Functions and Expressions Designing Gate Networks, Kmap simplification, Useful Combinational Parts, Programmable Combinational Parts, Timing and Control, Latches, Flipflops, Registers and Counters, Sequential Circuits.

**Arithmetic/Logic Unit:** Numbers Representation, Arithmetic Operations, Floating Point Arithmetic.

**Register Transfer Language and Microoperations:** Concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory. Design of Arithmetic & Logic Unit and Control Unit Control design hardwired control, micro programmed arithmetic and logical operations along with register transfer, timing register.

**Instruction and Addressing:** A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple I/O organization, Synchronous & Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access). Implementation of processor using the building blocks.

**Memory System Design:** Memory Origination, Memory Hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache Memory, Virtual Memory.

Assembly Language Programs, Assembler Directives, Pseudo Instructions, Macroinstructions, Linking and Loading.

**Vector and Array Processing:** Shared-Memory, Multiprocessing, Distributed Multi-Computing.

**Microprocessor Concepts:** Pin Diagram of 8085, Architecture of 8085, Addressing Mode of 8085, functional block diagram of 8085 assembly language, instruction set of 8085.

**Text Book:**

**References:**
Accounting and Financial Management

Class: I Sem. MCA
Branch: MCA
Schedule per Week
Lectures: 3
Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Contents of the Subject

Introduction to Accounting: Definition of Accounting and its advantages & limitations, Scope of accounting. Branches of Accounting - Financial Accounting - Cost Accounting - Management Accounting, users of Accounting information, Methods of Accounting, Double Entry Accounting System
Types of Accounts and Rules for Debit and Credit Preparation of Journal, Ledger and Trial Balance

Final Accounts: Preparation of Final Accounts (Sole Proprietorship only), Preparation of Trading A/c, Profit & Loss A/c and Balance Sheet covering simple adjustments.

Accounting Ratios: Meaning, Advantages and Limitations of Accounting ratios, Computation of profitability, liquidity, solvency, and turnover ratios.

Cost Accounting: Meaning and definition of Cost Accounting – its Advantages & Limitations
Marginal Costing: Meaning-Advantages- Limitations, Break Even Point, Margin of Safety, Profit Volume Ratio

Introduction to Financial Management: Meaning of financial management, functions and objectives of financial management Profit Maximization and wealth maximization, basic finance decisions, changing role of finance.

Text Books:


References

Office Management Lab

Class: I Sem. MCA

Evaluation

Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Contents of the Subject

**MS word Basics:** Introduction to MSWord; Features & area of use. Working with MS Word. Menus & Commands, Toolbars & Buttons, Shortcut Menus, Wizards & Templates. Creating a New Document; Different Page Views and layouts; Applying various Text enhancements. Working with Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features; Bullets, Numbering, Auto formatting, Printing & various print options.

Advanced Features of MS-Word: Spell Check, Thesaurus, Find & Replace; Headers & Footers

Inserting - Page Numbers, Pictures, Files, Auto texts, Symbols etc., Working with Columns, Tabs & indents; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Adding References and Graphics; Mail Merge, Envelops & Mailing Labels.

**MS Excel:** Introduction and area of use; Working with MS Excel., concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options

**MS PowerPoint:** Introduction & area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects; Designing & Presentation of a Slide Show; Printing Presentations

**MS Access:** Define data needs and types, define and print table relationships, Add, set, change or remove primary keys, Split databases, Create databases, Create tables, Modify tables, Enter records using datasheet view, Delete records from a table, Change records in a table, Create fields and modify field properties, Create reports, Modify the design of reports and forms.
C & C++ Lab

Class: I Sem. MCA

Evaluation

Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Contents of the Subject

Control Statements:-Programs on if-else ladder, iterative statements, Functions and recursions, predefined functions.

Pointer and Dynamic Memory:-Programs on Arrays, sorting (Bubble, selection, insertion) Searching (linear, Binary), 2D Array (Matrix operations), Pointers, Structures, union, enum, Dynamic Memory allocation

Programs on File Handling, Programs on Command Line Arguments.

Objects, Functions and Constructor:- Programs on classes and objects constructors, functions , inline functions, Friend function.

Polymorphism:-Programs on Function Overloading, overriding, Operator overloading, programs on different type of inheritances, virtual function.

Exception Handling and File Handling:- Programs on input/output Streams, Exception Handling, File Handling ,Template Classes.
Communication Skills

Class: I Sem. MCA

Evaluation

Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Contents of the Subject

Listening and Speaking Skills: Conversational Skills Formal and Informal Conversation listening to lectures, discussions, talk shows, news programs.

Writing Skills: Formal & Informal writings, report writing, Creative writing seminar, paper, bibliography.

Composition: Resume Writing, Business Letter Writing: Complaint, Job Applications and official correspondence; E-mail messages.

Presentation Skills: Elements of effective presentation, structure of presentation, voice modulation, audience analysis, body language, eye contact, sample videos. Debates, Seminar, Speeches, Lectures. Interviews, mock interviews.

Group Discussion Structure of GD, Moderator led and other ODs, Strategies in GD, team work body language, mock GD
Microprocessor Lab

Class: I Sem. MCA

Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Contents of the Subject

Storage Of Data: Implementation of programs related to storage of data in memory, exchange of memory content, addition and subtraction of 8 bit numbers and 16 bit numbers. Finding largest and smallest from given numbers

One's Complement and Two's Complement: Implementation of program for one's complement and two's complement, right shift and left shift of 16 bit data, multiplication and division of two 8 bit numbers. Calculation of factorial and square of a number. Implementation of program for calculation of sum of series of numbers sum of series of even numbers, sum of series of odd numbers.

Data Transfer: Data transfer from one memory block to other in same and reverse order

Array: Implementation of programs to search a number in array, arrangement in ascending and descending order

Conversion Programs: Implementation of program for addition, subtraction of two BCD numbers, BCD to binary and binary to BCD conversion HEX to decimal and HEX to binary conversion
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Computer Oriented Numerical Methods

Class: II Sem. MCA

Evaluation

Branch: MCA
Schedule Per Week
Lectures: 3
Examination Time: Three Hours Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Content of the Subject

Data Representation - Floating point Arithmetic – Addition, Subtraction, Multiplication and Division operation. Pitfall of floating point representation, Errors in numerical computation Iterative Methods, Measurement of Accuracy by using Absolute Error and Relative Error


Solutions of system of Linear equations- Direct Method - Gauss Elimination method and pivoting, Ill Conditioned system of equations. Iterative method- Gauss Seidal Method.

Interpolation and approximation: Finite Differences, Difference tables, Polynomial Interpolation: Newton’s forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, Stirling’s, Bessel’s, Everett’s formula.

Interpolation with unequal intervals: Langrange’s Interpolation, Newton Divided difference formula.


Curve Fitting - Curve fitting and Approximation: Method of least squares, fitting of Linear Function, fitting of Nonlinear Function- polynomials, exponential curves.


Algorithm of each numerical method mentioned in Lab Syllabus
Text Books:


References

Data Communication and Computer Networks

Class: II Sem. MCA
Branch: MCA
Schedule Per Week
Lectures: 3
Examination Time: Three Hours  Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Content of the Subject

Networking Fundamentals:

The Physical Layer
Transmission Media- Guided & Unguided, PSTN: Structure of the Telephone System, Data & Signals- Data types, Signal types- Analog & Digital, Modulation Techniques, Modem, Cable Modem, Protocols: DSL, ISDN.

The Data Link Layer
Design Issues: Framing, Error Control, Flow Control, Protocols: FDDI, CDDI, Frame Relay, ATM, 802.11, PPP, HDLC.

The Medium Access Sub-Layer

The Network Layer

The Application Layer
DNS: The DNS Name Space, Name Servers, E-Mail: SMTP, POP3, HTTP, FTP, Telnet, Network Management: SNMP.

Network Security
Cryptography: Encryption, Decryption, Private/Public Key, Digital Signatures, SSL, Firewalls, PGP, S/MIME.
Text Books:


References

Data Structures

Class: II Sem. MCA

Branch: MCA
Schedule Per Week
Lectures: 3
Examination Time: Three Hours  Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Introduction: Basic data structures such as arrays, linked list, stack, trees and queues and their applications, linked and sequential representation Basic Terminology, Elementary Data organization, Data Structure operations.

Queues, Stack implementation through Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation (row major and column major), Applications of arrays - Character Strings and string operations, Ordered Lists.


Queues: implementation of queues, Operations on Queue, Types of Queues - Circular queue, Deque and Priority Queue.

Recursion: recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion, Backtracking,, recursive algorithms, principles of recursion.

Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, insertion and deletion to/from Linked Lists, insertion and deletion Algorithms, Doubly linked list, Header lists, circular lists, sorted lists.


Searching: Sequential search, binary search, comparison and analysis.

Sorting: Insertion Sort, Bubble Sort, Quick Sort, Two-Way-Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for internal Sorting.


Text Book:

References:

Database Management System

Class: II Sem. MCA Evaluation
Branch: MCA
Schedule per Week
Lectures: 3
Examination Time: Three Hours  Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Contents of the Subject


Data modeling using the Entity Relationship Model: ER model concepts, Types of Relationships, notation for ER diagram, Reduction of ER-Diagrams to Relational Model, mapping constraints, Generalization, Aggregation, Specialization, Extended ER model, relationships of higher degree

Relational model: Storage Organizations for Relations, Relational Algebra, Set Operations, Relational Calculus, Concepts of Alternate key, candidate key, primary key, Foreign key, Integrity Rules, Data Dictionary.

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

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands: DDL, DML, TCL, DCL, SQL operators, Tables, views and indexes, Constraints Group By and Having Clause, Order By Clause, Queries and sub queries, Aggregate Functions, Numeric Functions, String Functions, Date & Time Functions, Insert, Update and Delete operations, Unions, Intersection, Minus, Joins: Equi-Join, Natural Join, Self-Join, Inner Join, Outer Join

Text Books:

References

System Analysis and Design

Class: II Sem. MCA

Evaluation

Branch: MCA
Schedule per Week
Lectures: 3
Examination Time: Three Hours   Maximum Marks: 100 [Mid-term (20) & End-term (80)]

Contents of the Subject

System Concept and Information System Environment

System Development Life Cycle

System Planning and Information Gathering

Information Gathering: need, Information about the firms, Information gathering tools, Interviewing, Arranging the Interview, Guides to a Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives. Case Study on Information Gathering.

Feasibility Study and System Analysis


System Design and System Security

Text Books:

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Introduction to Java Enterprise, API JDBC, fundamentals, J2EE multi-tier architecture, Web Applications in J2EE. Servlet fundamentals – architecture, life cycle of a servlet, initialization, threads, servlets and HTML, retrieving data in servlet, servicing he GET and POST requests, servlet sessions – session tracking, cookies. Servlets, JDBC and Inter servlet communications – JDBC, Driver types, JDBC servlet, JDBC connection pool, inter servlet communication, servlet security and different packages of JSP and servlets. JSP fundamentals – architecture, implicit objects, standard actions, JSP errors. J2ME – introduction, building MIDlets, creating a user interface, event handling with commands, tickers, screens, textbox, lists and forms.

Text/References:
1. David Flanagan, Jim Farley, W Crawford an Kris Magnusson, Java enterprise in a Nutshell, Shriff Publishers, Calcutta

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<th>S.No.</th>
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The internet: history of the world wide web, hardware and software trend, object technology – java script object, scripting for the web-browser portability. Introduction of HTML: introduction, markup language, editing HTML: common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables: intermediate HTML tables and formatting: basic HTML forms, more complex HTML forms, internal linking, creating and using image maps.
Java script – introduction to scripting: introduction- memory concepts- arithmetic- decision making. Java script control structures, Java script functions: introduction – program modules in
javascript - function definitions, duration of identifiers, scope rules, recursion, javascript global functions.


Dynamic HTML: CSS: introduction – inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the box model, user style sheets.

Dynamic HTML: object model and collections: introduction, object referencing, collections all and children, dynamic style, dynamic positioning, using the frames collection, navigator object.

Dynamic HTML: event model: introduction, event ON CLICK, event ON LOAD – error handling with ON ERROR, tracking the mouse with event, more DHTML events.


Text/References:

1. Internet & World Wide Web How to Program, Dietel & Dietel, Pearson.
2. Web Programming, Bai wt.al, Thomson

| 3 | MCA-303 | Computer Graphics | 3 | 1 | 20 | 80 | 100 |


Text/References:


Object-based Databases: Object-Oriented Databases: Object-oriented data model, Object Oriented Languages, Persistent Programming Languages. Object-Relational Databases: Nested Relations, Complex Types, Inheritance, Reference Types, Querying with Complex Types, Functions and Procedures Storage for Object Databases

Distributed Databases: Distributed Data Storage, Distributed Transactions, Commit protocol, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing

Parallel Databases: I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems

Deductive Databases: Introduction to Recursive Queries, Theoretical Foundations, Recursive Queries with Negation, From Datalog to SQL, Evaluating Recursive Queries


PL/SQL basics, blocks, architecture, variables and constants, attributes, character set, PL/SQL sentence structure, data types, precompiler, conditional and sequential control statements, control structures, conditional control, sequential control, cursors, exceptions, triggers, procedures and packages.

Text/References:

3. Ceri Pelagatti, Distributed Database: Principles and System - (McGraw Hill)


Information Gathering: need, Information about the firms, Information gathering tools, Interviewing, Arranging the Interview, Guides to a Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.


H/W / S/W Selection, Make V/s Buy decision and Maintenance, Documentation: Importance, Types of documentation, Security and disaster planning and management.

Text/References:
1. Systems Analysis and Design, Howryskiewycz, PHI
3. Analysis and Design of Information Systems, Senn, TMH
4. System Analysis and Design Methods, Whitten, Bentley
5. System Analysis and Design, Awad
6. Analysis and Design of Information Systems, Rajaraman, PHI
## MCA Year 2 Semester IV

<table>
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### Practicals

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*Elective 1

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Project Management, Management activities, Project planning, Project scheduling, Risk management

Software Requirements, Functional and non-functional requirements, User requirements, System requirements, Interface specification, software requirement document

Requirements Engineering Processes, Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management


Application Architectures — Data processing systems, Transaction processing systems, Event processing systems, Language processing systems, User Interface Design — Design issues, The user interface design process, User analysis, User interface prototyping, Interface evaluation

Rapid Software Development — Agile methods, Extreme programming, Rapid application development, Software prototyping. Software Reuse — Design patterns, Generator-based reuse, Application frameworks, Application system reuse, Software Evolution
Verification and validation, — Planning verification and validation, Software inspections, Automated static analysis, Verification and formal methods.

Software Testing — System testing, Component testing, Test case design, Test automation.

Software Cost Estimation — Software productivity, Estimation techniques, Algorithmic cost modeling, Project duration and staffing.

Quality Management — Process and product quality, Quality assurance and standards, Quality planning, Quality control, Software measurement and metrics


Text/References:
1. Software Engineering, Pressman, TMH

Text/References:
1. Applied Microsoft.NET framework programming, Jeffrey Richter, MSPress.
2..NET framework essentials Thuan L. Thai, Hoang Q. Lam,O’Reilly.

Text/References:
1. Introduction to Open source software, Linux, Linux Architecture, Linux file system (inode, Super block, Mounting and Unmounting), Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System call, System call for Files, Processes and Signals.

Shell Programming — Introduction to Shell, Various Shell of Linux, Shell Commands, I/O Redirection and Piping, Vi and Emacs editor, Shell control statements, Variables, if-then-else, case-switch, While, Until, Find, Shell Metacharacters, Shell Scripts, Shell keywords, Tips and Traps, Built in Commands, Shell Procedures and Reporting, Handling documents, C language programming, Prototyping, Coding, Compiling, Testing and Debugging.
Linux System Administrations – File listings, Ownership and Access Permissions, File and Directory types, Managing Files, User and its Home Directory, Booting and Shutting down (BootLoaders, LILO, GRUB, Bootstrapping, init Process, System services, Internet and Web service tools, E-mail, Remote Login and FTP, Networks and server setup, LAN, Connection with Internet, Setting up routers, Proxy Servers, Print Servers, File Server, Mail server, FTP server, Web server and News server, DHCP and NIS, Database server.

Text/References:

<table>
<thead>
<tr>
<th>4</th>
<th>MCA-404</th>
<th>Artificial Intelligence</th>
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</table>

Concept of intelligence, Artificial intelligence, definition turning test, areas of application. Search techniques, state space, Production rules, problem characteristics, production system characteristic, depth first, breadth first search methods and their analysis, Heuristic search method, generate and test, hill climbing, best first method, graph search, AND OR search methods, constraint satisfaction, backtracking.

Introduction to list and string processing and dynamic databases concept of knowledge, characteristics and representation schemes, Logic, prepositional and predicate calculus, resolution, semiotics nets, frames, conceptual dependency, scripts Monotonic reasoning, logical reasoning induction, natural deduction.

Nonmonotonic reasoning – default reasoning minimalist reasoning, statistical reasoning – Baye’s theorem, certainty factors, dempster shafer theory, Fuzzy logic.

Concept of learning, inductive and deductive. Knowledge acquisition, rote learning, discovery analogy.

Concept of expert system, need for an expert system, Component and categories of an expert system, need for an expert system, Stages in the development of an expert system.

Text/References:
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)

<table>
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<tr>
<th>5</th>
<th>MCA-405</th>
<th>E-Commerce</th>
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</thead>
</table>

Introduction, Definition, Objectives, Advantages and disadvantages, Forces driving E-Commerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model.

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses.

E-Marketing, E-Customer Relationship Management, E-Supply Chain Management.

Text/References:
2. Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH

---

Introduction to translators, compilers, interpreters, compilation process. Programming language grammars, derivations, reductions, regular expression, context free language and grammar.

Lexical analyzer, input buffering, specification and recognition of tokens, introduction to finite automata, regular expressions to NFA, minimization of DFA, keywords and reserve word policies, LEX – the lexical analyzer generator.

Syntax analyzer, context free grammars, top down parsing, brute force parser, recursive descent parser, L.L(1) parser, Bottom up parsing, operator precedence parsing, simple precedence parsing, LR parser, LALR parser, YACC – the parser generator.

Syntax directed translation schemes, implementation of syntax directed translators, synthesized attributes, inherited attributes, dependency graph, evaluation order, construction of syntax trees, directed acyclic graph of expression, bottom up evaluation of S-attributed definitions, L-attributed definitions, top down translation of L - attributed definitions.

Errors, lexical phase errors, syntactic phase errors.

Intermediate languages, postfix notation, syntax trees, parse trees, three address code, triples and indirect triples.

Translation of assignment statements, Boolean expressions, statements that alter flow of control array references, procedure calls, declarations, case statement, record structures.

Symbol tables, operation on symbol tables, symbol table organization for non-block structured languages, symbol table organization for block – structured languages.

Run time storage management, storage allocation and referencing data in block structured language, storage allocation.

Code optimization, sources of optimization, loop optimization, DAG and optimization of basic blocks. Code generation, a machine model, next use information register allocation and assignment, a simple code generator, code generation from DAG’s, Peephole optimization.

---

Text/References:
1. Aho, Ullman and Sethi: Compilers, Addison Wesley.
2. Holub, Compiler Design in C, PHI.

---

Classification: Parametric and non-parametric technology: Bayesian classification, two class and generalized class classification, classification error, Decision boundary, Discriminate functions, Non-parametric methods for classification.

Clustering: Hierarchical and non-hierarchical techniques, K-MEDOID Algorithm, Partitioning, Clara, Clarans. Advanced Hierarchical algorithms


Text/References:
1. Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, Harcourt India Pvt.
4. Alex Berson, Stephen J. Smith, Data Warehousing, Data Mining and OLAP, McGrawHill.
10. Tom Soukup, Ian Davidson, Visual Data Mining, Wiley Dreamtech India Pvt. Ltd.
## MCA Year 3 Semester V

<table>
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<tr>
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*Elective 2

MCA-504 Bio-Informatics
MCA-505 Geo-Informatics
MCA-506 Information Protection and Security

**Elective 3

MCA-507 Embedded Systems
MCA-508 ERP Systems
MCA-509 Soft Computing

### Text/References:

1. Designing Flexible Object Oriented Systems with UML. By Charls Richter Techmedia.
2. UML users guide by Booch. Rumbaugh, Jacobson –Addison Wesley
3. Object Oriented Modeling and Design by Rumbaugh.
4. Object Oriented Analysis & Design – Practical Applications By Booch – Addison Wesley.

Text/References:

Wireless LAN - infrared Vs radio transmissions - infrastructure and adhoc networks - IEEE 802.11 b/a/g - bluetooth - IEEE 802.16, Mobile network layer - mobile IP - packet delivery - registration - tunneling and encapsulation - optimizations - reverse tunneling - dynamic host configuration protocol

Text/References:
3. Stallings, W; Wireless Communications and Networks
5. Blake Roy, Wireless Communication Technology, Thompson

EMBNET – NCBI – virtual Tourism.
Primary Sequence Databases Biological data base – Primary Sequence Database – Composite Protein Sequence Database – Secondary Database - Composite Protein – Pattern database structure and classification of database.
Genome Information Resources - DNA Sequence data base – Specialised genomic Resources.
DNA Sequence analysis : Why analyse DNA? – Gene structure – Features of DNA sequence analysis – Issues in the interpretation and EST search – Approach of Gene hunting – Cell CDNA libraries and ESTs – Approaches to EST analysis – Effect of EST data on DNA data base examples of EST analysis.
Global and local Alignments : Algorithms – Similarities – Semi global alignment
Methods of Photo Genetics.: Distance Based Methods – Based Methods –Comparison.

Text/References:
1. T.K. Attwood, D.J. Parry-Smith, Introduction to Bioinformatics, Pearson Education Asia

Basic concepts about Spatial information, Definition, Historical evolution and need for spatially based resource information system, objectives of GIS - Manual v/s automated GIS.
Data structure types of data structure, Raster and Vector formats, advantages and disadvantages of various data structures and data formats.

Data input: data pre-processing, methods of data capture, digitization and scanning methods, commonly used map projections and ellipsoids.

The format of GIS - Handling digital Geographical Information Data - Analysis of single data planes in Raster format - Analysis of Multiple data planes in Raster format - Uses of topographic data in Raster format - Data structures for thematic maps.

Digital Elevation Model (DEM): need, methods, data sources and products of DEM - Digital Terrain Modeling (DTM) - Input verification, storage and methods of data analysis for Spatial modeling - Methods of GIS and Spatial interpolation

Text/References:
11. Coordinate Systems and Map Projections by Mailing, D.H., George Philip and Sons Ltd.


Text/References:

An Overview of Embedded system, Requirements, Challenges issues, and trends in software development.

Application market segments, control system and industrial automation, Data communication, Networked Information Appliances, Telecommunications.

Hardware Architecture: Processor, Memory, Latches and buffers, ADC & DAC, Application specific control, Display units, keypads, DSP.

Microcontrollers and their applications, Communication interfaces: Serial interface, IEEE 1394, USB, Infra red, Ethernet and PCI bus.

Embedded system development process : requirement , system architecture, operating system and processes. Development platform and tools, HLL support Cross compilers, Linux and Windows CE based development Tools. Mobile/ handheld systems.

Basic idea of embedded system application like mobile networks, GPS, Real time system, Database applications, Networked and JAVA-enabled information appliances, Mobile JAVA applications.

Text/References:

Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system.


Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendors evaluation criterion, ERP Implementation approaches and methodology, ERP implementation strategies, ERP Customization, ERP-A manufacturing Perspective.

Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid: Useful guidelines for ERP Implementations.

Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce.

Concept of E – Governance: Concept, E – Governance frame work, area of application like public sector, service industry.

Text/References:
1. A. Lexis Leon, Enterprise Resource Planning, TMH

Overview of Crisp sets and fuzzy sets: Basic concepts of crisp sets and fuzzy sets, Basic types of fuzzy sets, Fuzzy sets versus crisp sets, Representation and extension principle for fuzzy sets, Operations on Fuzzy sets

Fuzzy Relations and Fuzzy Logic: Crisp versus Fuzzy relations, Binary relations on fuzzy sets, Equivalence, compatibility and ordering relations, Morphisms and compositions of relations, Fuzzy relations equations, Fuzzy measures and possibility theory, Classical logic and multivalued logics, Fuzzy propositions and approximate reasoning


Computer Implementation of A Genetic Algorithm: Data Structures, Reproduction, Crossover, and mutation, A Time to reproduce, a time to cross, Get with the main program, How well does it work?, Mapping objective functions to fitness form, Fitness scaling, Codings, A multiparameter, Mapped, Fixed-Point coding, Discretization, Constraints

Introduction To Genetic-Based Machine Learning: Genetics-Based machine learning: whence it came, What is a classifier system?, Rule and message system, Apportionment of credit: The bucket brigade, Genetic algorithm, A simple classifier system in Pascal, Results using the simple classifier system

Text/References:

### MCA Year 3 Semester VI

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**Guidelines:**

1. Paper MCA – 104, Exercises must be carried out in Linux environments.
2. Paper MCA – 457, At least one case study of an industry standard software must be carried out with one system design project. This will be a group activity having maximum of 3 students.
3. Paper MCA – 551 will be a group activity having maximum of 3 students.
4. Paper MCA – 554 will be individual activity in which student has to prepare and present a seminar along with report on some latest topic related with information technology.