Department of Computer Science & Information Technology
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)
SYLLABUS FOR MCA COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS) *

MCA

Note: The decision of the GG Vishwavidyalaya for implementing CBCS system on this course shall be final, rest will remain the same.

Semester 1

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-101	Introduction to Information Technology	4		40	60	4
2	MCA-102	Programming Based Numerical Analysis	4		40	60	4
3	MCA-103	Programming in 'C' Language	4		40	60	4
4	MCA-104	Data Structure	4		40	60	4
5	MCA-105	Computer Organization	4		40	60	4
6	MCA-106	LAB-I:Programming in C		1		100	1
7	MCA-107	LAB-II: Data Structure Using C		1		100	1
		Total	20	02	200	500	22

Semester 2

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-201	Principles of Operating system	4		40	60	4
2	MCA-202	Object Oriented Programming with C++	4		40	60	4
3	MCA-203	Discrete Mathematics	4		40	60	4
4	MCA-204	Elective I(Web Technology)	4		40	60	4
5	MCA-205	Elective II(Theory of Computation)	4		40	60	4
6	MCA-206	Lab based on C++		1		100	1
7	MCA-207	Lab Based on Elective-I		1		100	1
		Total	20	02	200	500	22

Semester 3

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-301	Programming in JAVA	4		40	60	4
2	MCA-302	Artificial Intelligence and Expert Systems	4		40	60	4
3	MCA-303	Relational Data Base Management System	4		40	60	4
4	MCA-304(Elective-I)	Elective I (Compiler Design)	4		40	60	4
5	MCA-305(Elective-II)	Elective II(Computer Network)	4		40	60	4
6	MCA-306	Lab based on JAVA		1		100	1
7	MCA-307	Lab Based on RDBMS		1		100	1
		Total	20	02	200	500	22

Semester 4

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-401	Analysis and Design of Algorithm	4		40	60	4
2	MCA-402	Software Engineering	4		40	60	4
3	MCA-403	Operation Research	4		40	60	4
4	MCA-404(Elective-I)	Elective I(Financial Accounting)	4		40	60	4
5	MCA-405(Elective-2)	Elective II (Management Information System)	4		40	60	4
6	MCA-406	Lab based on C#		1		100	1
7	MCA-407	LAN Based Mini Project		1		100	1
		Total	20	02	200	500	22

Semester 5

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-501	Soft Computing	4		40	60	4
2	MCA-502	Interactive computer graphics and multimedia	4		40	60	4
3	MCA-503	Data Mining and Data Warehousing	4		40	60	4
4	MCA-504	Elective I (Network Security)	4		40	60	4
5	MCA-505(Electve-II)	Elective II (Parallel Processing)	4		40	60	4
6	MCA-506	Lab based on MATLAB		1		100	1
7	MCA-507	Web Based Mini Project		1		100	1
		Total	20	02	200	500	22

Semester 6

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-601	Major Project	-	-	-	500	15
		Total	-	-	-	-	15

Total Course Credits – 125

Note: Electives to be decided at the start of the respective semester

MCA-101

Introduction to Information Technology

1. **Introduction-** Basics concept of IT, Concept of data and information, Generations and Classification of Computers, Organization of computers: CPU, Memory, Input and Output devices, File organizations.

2. **Software and Computer Languages-** Software, Types of software: System software, Application software, Utility software, Firmware. Generations and Types of Programming Languages, Programming Paradigms: procedural oriented and object oriented programming, Computer Security.

3. **Communications and Internet-** Data communications, Analog and digital signal, Communication media, Network topology, Network categories, The OSI model and TCP/IP model, Internet addressing, Internet Service Provider (ISP), Web browsers, URL, WWW, HTTP, E-mail, File transfer, Domain Name System (DNS), Wireless technology: GPS, Wi-Fi.

4. **Applications of IT-** IT in Home, Entertainment, Business, Industry, Science, Engineering and Medicine, Online banking, Online shopping, E-Learning, E-commerce, M-Commerce, E-Government.

5. **Latest IT Trends-** Artificial intelligence, Data warehousing, Data mining, Overview of geographic information system (GIS), Cloud computing, Information and communications technology (ICT), Parallel computing, Introduction to web services.

Readings:

1. Fundamental of Computer 5th Edition By V. Rajaraman, PHI Publication.
2. Introduction to Information Technology by V. Rajaraman, PHI Publication.
3. Information technology today By S. Jaiswal.
4. Fundamental of IT: Leon and Leon, Leon Tec World.
5. Introduction to Information Technology by Aksoy and DeNardis, Cengage Learning.

MCA- 102

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Programming Based Numerical Analysis

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1. **Algebraic Equation :**Computer Arithmetic – Floating point Numbers- Operations Normalization and their consequences. Iterative Methods – Roots of a Single transcendental equations and roots of Polynomials using Bisection Method , False position Method , Newton Raphson Method.

2. **Simultaneous Algebraic Equation :**Gauss Elimination Method, Gauss-Jordan Method, Factorization Method, Jacobi's Iteration Method, Gauss- seidal Iteration Method.
   Matrix Inversion & Eigen Value: Gauss Jordan Method, Factorization Method and Eigen Vectors.

3. **Interpolations:** Polynomials interpolation, Newton Method. Lagrange's Interpolation Formula and difference tables. Least Square Approximations- Linear regression only.

4. **Differentiation and Integration**- Formula for Numerical Differentiation and Numerical integration by Trapezoidal Rule and Simpson's rule only.

5. **Numerical Solution of Differential Equation** :- Euler's Method, Taylor series Method, Runge- Kutta Method.

 Readings:

1. Numerical Methods By V. Rajaraman, 3rd Edition, Prentice-Hall India Pvt. Ltd.
2. Numerical Methods By S.S. Shastri, 4th edition, 2005,PHI publications.
3. Numerical Methods in Engineering and Science, 36th Edition, Khanna Publishers, Delhi.
4. Computer Based Numerical and Statistical techniques, P.K.Mittal and Mukesh B.,Galgotia Publication.

MCA-103

Programming in 'C' Language

1. **Fundamentals of C Programming:** Overview of C, History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables.
   Operators and Expressions: Arithmetic operators, Relational operator, Logical operators, operator precedence and associativity, Type casting, Expressions, Console I/O formatting, Unformatted I/O functions.
   Control Constructs: If-else, switch-case and break, branching statements
   Loops: for, do while, while, Nested loops, break and continue, goto, exit function.

2. **Arrays, Strings and Functions**: **Array:** Numeric and character arrays, Multidimensional arrays. **String:** String manipulation with/without using library function.
   Functions: Call by value and call by reference, Recursive function
   Command line arguments.
   Structure, Union & Enum: Structure: Array of structure, array within structure, Nested structure, passing arguments and returning structure for functions.declaring union and its usage.

3. **Dynamic Data Structures in 'C' - Pointers**: * and & operators. void pointer, pointer to pointer, pointer arithmetic, pointer comparison, Pointers to functions, function returning pointer, passing function as argument to function,Pointer to structure.
   Dynamic memory allocation functions – malloc, calloc, realloc and free.

4. **File Handling and Miscellaneous Features:** Basics**,** file pointer, File accessing Functions, File handling through command line argument**.**
   Introduction to C preprocessor: #include, #define, conditional compilation directives: #if, #else, #elif,#endif, #ifndef etc.

5. **Graphics in C:** Detection, initialization, and loading of graphics driver for the programs. Constant, Data types and global variables used in graphics. Library functions used in drawing, union REGS, General 8086 software interrupts interfaces, int86, int86x, GUI interaction within the program.

Readings:

1. Programming in C "Yashvant Kanetkar", BPB Publications,Tenth Edition.
2. Programming with C "Venugopal", TMHOutline Series,Third Edition.
3. The C Programming Language "Kemigham and Ritche [Prentice Hall]"
4. Programming in C Language, "Dr Amit Saxena" Ananya Publication
5. Programming in C Language "Bala Gurusamy" Fourth Edition
6. Theory and Problems of Programming with C, Byron S. Gottfreid, McGraw-Hill
7. Graphics Under C "Yashvant Kanetkar" BPB Publication

MCA-104

Data Structure

1. **Basics terminologies:** Introduction to basic data Structures: Arrays, linked list, trees, stack, queue, Data structure operations; time complexity, space complexity.

2. **Stacks, Queues:** Stacks; Array representation of stack; Linked representation of stack; Various polish notation's-Prefix, Postfix, infix; Evaluation of a postfix & Prefix expression; Conversion from one another; Application of stack; Queues; Linked representation of queues; De queues; Circular queue; Priority queue;.

3. **Searching and Sorting:** Searching algorithm: linear search, binary search; sorting algorithms: Bubble sort, Insertion sort, Selection sort, Quick Sort, Merge sort and Heap sort.

4. **Trees :**Binary trees; Representation of binary tree in memory; traversing binary tree; Binary search trees; Searching and inserting in binary search trees; Deleting in a binary search ,tree; AVL search trees; Insertion and deletion in binary search trees; Heap.

5. **Graphs :** Terminology & representation; Warshall algorithm; Shortest path; Minimum spanning tree; Kruskal & Dijkstara algorithm; Operation on graph; Traversing a graph.

READINGS:

1. Data Structure By Lipshutz, McGraw Hill.
2. Data Structure By Standish, Addison-Wesley.
3. Data Structures using C By A. M. Tennenbaum, Y. Langsam and M. J. Augenstein,PHI, 1991

MCA-105

Computer Organization

1. **Number System**: Binary, Octal and Hexadecimal number system, Conversion from one number system to another, Binary arithmetic, Representing negative numbers, BCD codes, ASCII codes, EBCDIC codes, Excess three code, Gray code, Floating point representation, 1's complement and 2's compliment,
Arithmetic representation of signed binary numbers, 9's complement and 10's compliment system.

2. **Logic Gates and Boolean Algebra**: Properties and Symbolic Representation Of NOT, AND ,OR,NOR,NAND ,EX-OR,EX – NOR GATES, NOR and NAND GATES as a universal gates, Laws and identities of Boolean algebra, Demorgan's theorem, Use of Boolean algebra for simplification of logic expression, SOP and POS forms, Canonical forms, Maxterm, Minterm, Karnaugh map for 2,3,4 variable.

3. **Combinational and Sequential Circuits:** Multiplexer, De multiplexers, Decoders, Encoders, Half adder, Full adder, Half subtractor, Full subtractor, n-bit adder, Adder-subtractor, Flip flops, Registers, Counters.

4. **CPU Organization and Parallel Processing:** General register organization of C.P.U, Stack organization, Instruction format, Addressing modes, Parallel processing, Pipelining, Arithmetic pipelining, Instruction pipeline, RISC pipeline, Vector processing, Array processor**.**

5. **Memory Organization:** Memory hierarchy, Types of memory, Associative memory, Virtual memory, Cache memory.

Readings:

1.   M. Morris Mano, Digital Design, 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2.   Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 5d., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
3.   R.P.jain, Modern Digital Electronics, 3ed., Tata McGraw-Hill publishing company limited , New Delhi, 2003.
4.   Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill,2002.
5.   William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th Edition, Pearson Education, 2003.
6.   David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 2nd Edition, Morgan Kaufmann, 2002.

MCA-201

Principles of Operating System

1. **Introduction**: Definition, Design Goals, Types, Batch processing, Multi-programming, Real time, Time sharing; Functions of Operating System.

2. **Process Management**: Process states, Process Control block, Schedulers, CPU Scheduling algorithms

3. **Inter process synchronization and communication:** need, Mutual exclusion, semaphore, classical problems in concurrent programming, critical region and conditional critical region, Deadlock Characteristics, prevention, resource allocation graphs.

4. **Memory Management**: Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses, Contiguous Allocation, Fragmentation, Paging, Segmentation, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, Global Vs Local Allocation, Thrashing,

5. **File and Secondary Storage Management**: File Attributes, File Types, File Access Methods, Directory Structure, File System Organization, Allocation Methods, Free Space management; Disk Structure, Logical and Physical View, Disk Head Scheduling, Formatting, Swap Management.
   UNIX/ LINUX/ WINDOWS/Android as an example of Operating systems

Readings:

1. Operating System Concepts 6/ed By Silberschatz and Galvin, Addison Wesley.
2. Operating Systems: Internals and Design Principles 5/ed By William Stalling, PHI.
3. Modern operating Systems By Tanenbaum, PHI.
4. Operating System Concepts By Peterson and Silberschatz, Addison Wesley.
5. Operating System Principles By P. B. Hansen, PHI.
6. The UNIX Operating System By K. Christian, John Wiley.

MCA-202

Object Oriented Programming with C++

1. **Principles of OOP**

   Procedure oriented Vs Object oriented, OOP paradigm, Features of OOP ,Basic Data types Tokens, Keywords, Constant ,Variables, Operator I/O statements , Structure of C++ program, Arrays, pointers, Object modeling technique (OMT).

2. **Function, Object and Class**

   Defining class, Abstract class ,Function prototype, Function with parameter ,Passing object as a parameter, Constructor function ,Types of constructor, Destructor Friend function , Friend class, Dynamic allocation operator new and delete.

3. **Polymorphism and Inheritance**

   Types of polymorphism, Constructor overloading ,Operator overloading, Template function Template class, Types of inheritance ,Private ,protected and public derivation of class ,Resolving ambiguity Pointer to object, This pointer ,Virtual class , virtual function.

4. **Input - output and File handling**

   I/O classes ,File and stream classes ,Opening and closing file Detecting end of file, String I/O, Char I/O, Object I/O, I/O with multiple object ,File pointer, Disk I/O.

5. **Exception handling, Name spaces and Standard Template library (STL)**

   Need of Exception handling ,try ,catch and throws keywords , defining namespace ,benefit of namespace, Component of STL.

   Readings:

1. Object oriented programming with C++ by E.Balagurusamy II nd edition Tata Mc-Graw Hill.
2. Object Oriented Programmin By McGregor and Sykes S A, 1992 Van Nostrand.
3. The C++ Programming Language   By Strustrp B,Addision Wasley.
4. Object Oriented Programming in C++ By Lafore R, Galgotia Publications.
5. Introduction to Object Oriented Programming By Witt KV, Galgotia Publications.
6. Object Oriented Programming By Blaschek G, Springer Verlag

MCA-203

Discrete Mathematics

1. **Mathematical Logic** : Notations, Algebra of Propositions & Propositional functions, logical connectives, Truth values & Truth table Tautologies & Contradictions, Normal Forms, Predicate Calculus, Quantifiers.

    Set Theory: Sets, Subsets, Power sets, Complement, Union and Intersection, De-Morgan's law Cardinality, relations: Cartesian Products, relational Matrices, properties of relations equivalence relation functions: Injection, Surjection, Bijection, Composition, of Functions, Permutations, Cardinality, the characteristic functions recursive definitions, finite induction.

2. **Boolean Algebra :** Truth values and truth tables, the algebra of propositional functions, boolean algebra of truth values Axiomatic definitions of Boolean algebra as algebraic structures with two operations, Switching Circuits.

3. **Groups :** Groups, axioms, permutation groups, subgroups, co-sets, normal subgroups.

4. **Graphs :** Simple Graph, directed graph, Degree of a Vertex, Types of Graphs, Sub Graphs and Isomorphic Graphs, Operations of Graphs, Path, Cycles and Connectivity, Euler and Hamilton Graph, Shortest Path Problems, BFS ,DFS, Dijkastra's Algorithm, Representation of Graphs, Planar Graphs, Applications of Graph Theory.

5. **Matrices :** Addition, subtraction, multiplication, transposes.

Readings:

1. A text book of Discrete Mathematics By Swapan Kumar Sarkar (S. Chand & company Ltd.).
2. Discrete Mathematical structure with Applications to computer science By J.P Trembly & R.P. Manohar.
3. Discrete Mathematics By K.A Ross and C.R.B writht.
4. Discrete Mathematics Structures By Bernard Kohman & Robert C. Bushy.
   for computer science
5. Discrete Mathematics By Seymour Lipschutz Mare Lipson. Tata McGraw-Hill Edition.

MCA-204

Web Technology (Elective-I)

1   **Internet Concept**: Fundamental of Web ,History of Web, Web development overview, Domain Name System (DNS),DHCP,and SMTP and other servers ,Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture ,Web Browser and Web Server.

2.   **HTML and DHTML:-** HTML Tag, Rules of HTML, Text Formatting and Style, List, Adding Graphics to Html Document, Tables and Layout , Linking Documents, Frame, Forms, Project in HTML, Introduction to DHTML, CSS, Class and DIV, External Style Sheet.

3.   **Scripting Languages:**Java Script (JS) in Web Page, Advantage of Java Script, JS object model and hierarchy ,Handling event ,Operators and syntax of JS, JS Function, Client side JS Vs Server side JS ,JS security, Introduction to VB Script, Operator and   Syntax of VB Script, Dialog Boxes, Control and Loop, Function in VBS.

4.   **XML:**Introduction to XML, XML in Action, Commercial Benefits of XML, Gaining Competitive advantage with XML, Programming in XML, XML Schema ,XSLT ,DOM structure model ,XML quires and transformation.

5.   **Active Server Page (ASP):** Introduction ,Internet Information System (IIS),ASP object ,Server object, File system object, session ,Accessing data base with an ASP page ,ODBC – ADO connection object, common methods and properties, ADO record set object .Introduction to ASP.Net.

Readings:

1. The complete Reference By Thomos A. Powell ,TMH publication
2. Web Technology :A Developers Perspective ,N.P.Gopalan ,J.Akilandeswani,PHI Publication.
3.Java Script :The definite Guide By Flangam , O'Reilly
4. Java Script :Developers Resource by Kamran Husain and Jason Levitt PTR-PHI
publication. 5."Mastering VB Script" BPB Publication.
6.World Wide Web design with HTML by Xavier Tata McGraw Hill Publication .
7. XML By Example, Sean Mc Grath Pentice Hall Publication.
8. Web Technology : A Developments Perspective , N.P. Gopalan, J. Akilandeswari, PHI Publication.

MCA-205

Theory of Computation (Elective-II)

1 **Theory of Automata:** Definition of an automaton, Transition system, Acceptability of a string by FA, Nondeterministic finite state machine, Designing of DFA and NFA ,Equivalence of DFA and NFA, Conversion of NFA to DFA, M Minimization of finite automata, Mealy and Moore models, Minimization of finite automata.

2 **Formal Languages, Regular Sets and Regular Grammars:** Definition, Languages and their relation, Chomsky classification of language, Regular expression, and Finite automaton, Pumping Lemma for regular sets, Application of Pumping lemma, Closure property of regular sets, Regular sets and regular grammar.

3 **Context-free Language**: Context fee language and derivation trees, Ambiguity in context free languages, Simplification of context free languages: (left recursion, Unit production elimination, Eliminating null values) Normal forms of context free languages.

4 **Pushdown Automation**: Definition, Acceptance by PDA, Designing PDA, Push down automation and Context free languages, Parsing and Pushdown automata.

5 **Turing Machine:** Turing Machines model, Representation of TM, Languages acceptability by TM, Design of TM, Introduction: Universal Turing Machines and Halting problem, Introduction: Linear bounded automata and languages.

Readings:

1. K L P Mishra "Theory of Computation",3rd Edition PHI Publication.
2. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003
3. G.PSaradhiVarma and B. ThirupathiRao , " Theory and Computation Formal Languages and Automata Theory",2005, SCITECH publication.
4. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003
5. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.

MCA-301

Programming in JAVA

1. Overview of JAVA : The genesis of java, An overview of java, java virtual machine (JVM) ,Java development kit (JDK) ,Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements, Introducing Class, closer look at Methods and class ,Nested and inner class ,Exploring Java.lang, String handling ,Constructor ,Garbage collection and finalize() method. Writing simple JAVA program.

2. Inheritance, Packages and interface- Types of inheritance ,Access specifier ,using super, method overriding , Abstract class ,constructor in multilevel inheritance ,using final with inheritance ,Dynamic method dispatch , Defining package, CLASSPATH, Access protection ,Importing package ,Defining and implementing interface , Extending interface, Nested interface.

3. Exception handling and Multithreading: Using try and catch ,multiple catch classes, Nested try statements , throw ,throws and finally ,Built in exception ,Uncaught exception , Creating own exception class , Java

Thread Model: Main thread ,Creating own Thread ,Life cycle of thread, Thread priorities ,Synchronization and messaging, Interthread communication ,Suspending ,Resuming and stopping thread.

4. Input Output and Networking :I/O classes: Byte stream and character stream ,Predefined stream ,reading console input, writing consol output,PrintWriter class ,Reading and writing files. **Networking** : classes and interface ,Socket and overview, TCP/IP client socket and server socket ,Inet address ,URL Connection, Datagram.

5 . Applet ,AWT,Swing, Event handling and Advance JAVA– Applet life cycle, Creating an applet,

Using image and sound in applet ,passing parameter.Exploring AWT and introduction to Swing.Event handling – The delegation-event model , Event classes ,Source of event, Event listener interfaces ,handling mouse and keyboard event ,Adapter class.

Advance JAVA : JDBC API. Servlet – Overview of servelet,Life cycle of servlet, JAVA servlet architecture Generic servlet and http servlet ,The servlet interface, Request and response.

Readings:

1. Java: The complete reference By Naughton P and schildt H. ,Osborne Mcgraw-Hill, Berkeley, USA, 1997.
2. Simply JAVA :An Introduction to JAVA programming By James R. Levenick ,Firewall Media publication New,Delhi
3. Java Programming By E.Balguruswami
4. Core JAVA for beginners By Rashmi Kanta Das ,Vikas Publication.
5. Core JAVA : A Comprehensive Study by Mahesh P. Matha , PHI publication.

MCA -302

Artificial Intelligence and Expert Systems

1. **Introduction:** Definitions and approaches, Foundation of A.I. , Challenges in AI, Area and Applications of A.I., Intelligent Agents: meaning, types, environments, examples.

2. **Problem Solving:** Problem solving as state space search, production system, writing production system and solution for a Water jug problem; some AI classical problems (statements only) cannibal missionaries, tower of Hanoi, tic tac toe, 8-puzzle, Search techniques: Breadth First, and Depth-first, Best-First Search, Hill-climbing, Heuristics, A* algorithm, local and global maxima(minima),

3. **Knowledge Representation and Reasoning**: Predicate and prepositional logic, conversion of sentences to wffs of predicate logic, Resolution, clause form, Skolem functions, Unification, Resolution in Propositional and predicate logic, Semantic Nets.

4. **Pattern Recognition:** Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classifiers, K-NN, K-MEANS algorithms.

5. **Expert Systems:** Introduction, Advantages, components and participants in an expert system, Application

Readings:

1. Artificial Intelligence: E. Rich and K. Knight, Tata McGraw Hill.
2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann.
3. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001) ,John wiley, New York.
4. Pattern Recognition : Technique and Applications By Shinghal (2006) ,Oxford University Press,New Delhi.

MCA - 303

Relational Data Base Management System

1. **Overview of Database Management** :Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.

2. **Relational Model :** Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.

3. **Structured Query Language :**Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING… ORDERBY….), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.

4. **Relational Database Design :**Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.

5. **Introduction to Query Processing and Protecting the Database & Data Organizations :** Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.

Readings:

1. Database system concept By H. Korth and A. Silberschatz, TMH.
2. Data Base Management System By Alexies & Mathews , Vikas publication.
3. Data Base Management System By C. J. Date ,Narosha Pub.
4. Data Base Management System By James Matin .
5. Principles of Database System By Ullman.
6. An Introduction to database systems By Bipin Desai, 2011 ed.,Galgotia Publication.
7. Database Management System By A. K. Majumdar & P.Bhattacharya, TMH

MCA-304

Compiler Design (Elective-I)

1. **Basics of Compilers and Lexical Analysis:** Compilers and Translators, Bootstrap compiler, Phases of Compiler, Compiler writing tools, Bootstrapping, Overview of one pass compiler, Finite Automation, Basics of DFA, NFA, Regular sets and Regular expressions.

2. **Syntax analysis & Parsing techniques:** Basics of context free grammars and derivation of parse trees, Top down parsing and its implementation, Operator precedence parsing, Predicative top down parser, Bottom up parsing, Handel of right sentential form, LR parser, Canonical collection of sets, Construction of parsing action and GOTO table, Construction of LALR parsing table, Handling ambiguous grammar.

3. **Syntax directed definition and Translation**: L-attributed definition, Syntax directed translation scheme, Intermediate code generation**,** Representing three address statements, Syntax directed translation scheme to specify the translation of various programming language construct, Implementing increment and decrement operators, Array reference, Switch/case.

4. **Symbol table management & Error Handling**: Various approaches to symbol table organization, Representation of scope information in symbol table, Storage allocation activation of procedure and record, Static allocation and stack allocation. Error recovery, Error recovery in LR parsing, Predicative parsing error recovery.

5. **Code Optimization and Code Generation** : Introduction, Loop optimization, Eliminating induction variable, Eliminating local common sub expression, DAG, Eliminating global common sub expression, loop unrolling, loop jamming, Problems hindering code generation, Straight forward code generation, Using DAG for code generation, Peephole optimization.

Readings:

1.Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman. "Compilers Principles, Techniques and Tools".
   Pearson Education,2008.

2.O.G.Kakde, "Compiler Design", 2005, Laxmi Publication.

3. AdeshK.Pandey" Concepts of Compiler Design ", First Edition, S.K.Kataria& Sons
Publication. 4.Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan
Koffman,1997. 5.AllenHolub, "Compiler Design in C", Prentice Hall of India, 1990.

MCA 305

Computer Networks (Elective-II)

1. **Introduction and Physical Layer :Introduction:** Goal and application Network Hardware and Software , Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connection less services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .

   Physical Layer :Data and signal, Analog and digital Communication, Transmission Media ,Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.

2. **Data Link Layer :** Data Link Layer design issues Data link control:Framing, Flow control. Error Detection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation :static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.

3. **Network Layer :** The Network Layer Design Issue, IP addressing, Address mapping, Error reporting , Multicasting ,Delivery, Forwarding and Routing. The Network Layer in the Internet : The IP Protocol. subnets, Internet control protocols ,internet multicasting.

4. **Transport Layer :**The Transport layer services, The   concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.

5. **Presentation and Application Layer :** Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols.

   Readings:

   1. Data Communications and Networking By Forouzan, Tata McGraw Hill Company. 2
   Computer Networks By A.S. Tanenbaum
   3.   Computer Network By S.S.Shinde ,New Age International Publisher.
   4.   Data and computer Communication by Shashi banzal ,Firewall media .
   5.   Internetworking with TCP/IP :Principles,protocols,and Architecture Vol 1 5th Edition ,PHI publication
   6.   Data Communications and Computer Network by Prakash C Gupta, PHI Publication.

MCA-401

Analysis & Design of Algorithm

1. **Introduction:** Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation-Big oh notation, Omega notation, Theta notation and Little oh and omega notation, recurrence relation: Substitution method, Master method

   Deterministic Algorithms
2. **Divide and conquer**: General method, applications-Binary search, Quick sort, Merge sort,

   Greedy method: General method, Greedy knapsack problem, Minimum cost spanning trees: prim's and kruskal's algorithm, Single source shortest path problem: Dijkstra's Shortest Path Algorithm, Huffman coding.

3. **Dynamic Programming**: General method, applications-Matrix chain multiplication, Optimal binary search trees, , Longest Common Sub sequence Problem.

   Back Tracking: 8-quen problem, Graph Coloring, Hamiltonian Cycle,
   Branch and Bound: 0/1knapsack problem, travelling sales person problem

   Non Deterministic Algorithms
4. **Interactable problems**: Basic concepts , non deterministic algorithms, NP-Hard and NP-Complete problems, Classes P and NP, Reducibility, Satisfiability Problem, Cook's theorem.

   Approximation: Graph Coloring, Task scheduling, bin packing,
   Probabilistic algorithm : Numerical integration, primality testing,
   Graph Algorithms: BFS and DFS and its applications.

5. **Evaluation of Algorithm**
   Lower bound Techniques: Lower bound techniques, Comparison Techniques, reduction.

Readings:

1. The Design and Analysis of Computer Algorithms , A.Aho, J. Hopcroft and J.Ullman, Addison Wesley.
2. Fundamentals of Computer Algorithms , E. Horowitz and S. Sahani, Galgotia, New Delhi.
3. Introduction to the Design and Analysis of Algorithms , S.E.Goodman and S.T.Hedetniemi, McGraw Hill.
4. Design Methods and Analysis of Algorithmics , G.Brassard and P.Bratley, PHI.
5. Design Methods and Analysis of Algorithms, S.K.Basu, PHI, 2005.
6. Introduction To Algorithms , Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein ,MIT Press
7. Rosen, Kenneth , Discrete Mathematics and Its Applications , McGraw-Hill Science
8. W. W. Rouse Ball (1960) The Eight Queens Problem, in Mathematical Recreations and Essays, Macmillan, New York, pp 165-171.

MCA - 402

Software Engineering

1. Software Engineering Fundamental

Introduction, evolution of software Engineering, software Engineering Approaches, Software Life Cycle Models waterfall, classical water fall ,prototyping model, evolutionary model ,spiral model(METAMODEL) , Comparisons of all models, Software project Management activities: project planning ,project Monitoring and controlling activities, Metrics for Project Size Estimation: line of Code, Function Point etc, Project Management techniques: Empirical Estimation, Heuristic Techniques COCOMO, Analytical Estimation Techniques Halstead method, project Scheduling. Software requirement Analysis and Specification, SRS and its characteristics.

2. Software Design

Classification of design Activity and design methodologies, Module Level concept Cohesion and coupling, function oriented software design: design principles structured analysis, DFDs. Object oriented Software Development ,UML, User interface designing: Basic Concepts, Types of interfaces, fundamentals of Component –based GUI development.

3. Coding and Testing

Coding standards and guidelines, code review techniques, software documentation, gunning fog index.
Testing and its various terminologies ,various types of testing ,Black box testing :equivalence class partitioning ,boundary value analysis ,White box testing its various types ,McCabe's Cyclometric Complexity Metric, Mutation testing ,types of error and debugging .

4. Software Reliability, Quality Management

Software reliability and software Quality Assurance, Software reliability Metrics , types of system Failure, software quality factors, software quality management , ISO 9000 certification, SEI Capability Maturity Model(CMM) its level, focus and key process .

5. Software Maintenance

Characteristics of Software management, types of maintenance, Software reverse Engineering, estimation of Maintenance Cost. Emerging trends and various tools.

Readings:

1. Software Engineering: A practitioner Approach, Pressman Rogers, TMGH
2. Fundamentals of Software Engineering, Rajib Mall, PHI
3. An Integrated approach of software Engineering, Pankaj Jalote, Narosa, New Delhi.
4. Software Engineering Demystified by Deepti Bhanot, Galgotiya Publication.

MCA-403

Operation Research

1. Introduction to OR, The Nature and Meaning of OR, History, Management Applications of OR , Principles, Characteristics, Scope of OR.

2. **Linear Programming**-Introduction and Applications of LP, Limitations of LP Formulation of a LP Model,Graphical Solution of a LPP, Simplex Method, Two Phase Method, Big-M Method, duality in LPP.

3. **Transportation Problem** – Introduction, Mathematical Formulation, Feasible Solution and Optimum Solution(simple case only).

4. **Assignment Problem** – Introduction, Mathematical Formulation, Traveling Salesman Problem, elementary Problems, Replacement Problems-Types, Simple Replacement Problems.

5. **Project Management by PERT-CPM** – Introduction, History & Applications, Basic Steps, Network Diagram Representation, Rules, Time Estimates and Critical Path in Network Analysis, Uses and Applications of PERT/CPM.

Readings:

1. Operations Research By H.A.Taha
2. Operations Research By V.K.Kapoor
3. Operation Research By S.D. Sharma

MCA-404
Financial Accounting (Elective-I)

1. Meaning and objects of accounting, Accounting Cycle, Accounting concepts and conventions, accounting equations, rules of journalizing, ledger posting.

2. Cash book, preparation of trial balance, trading and profit and loss account and balance sheet with adjustments relating to closing stock, outstanding expenses, prepaid expenses, Accrued income depreciation, Bad debts, provision for bad debts, provision for discount on debtors and creditors.

3. Basic concepts of cost accounting, elements of cost, classification of cost, preparation of cost sheet, inventory pricing, numerical through FIFO and LIFO methods.

4. Cost volume, profit analysis, standard costing computation of material and labor variances.

5. Budgetary control, preparation of cash budget and flexible budget, Zero base budgeting.

BOOKSRECOMMENDED:

1. Chadwick, " The Essence of Management Accounting", PHI, India.
2. Subhash Sharma, "Management Control Systems (Text & Cases)", Tata McGraw Hill.
3. P. Sarvancel, " Management Control Systems"
4. Grewal, " Introduction to Book Keeping".
5. S.M. Shukla, Financial accounting, Sahitya Bhawan Publications,Agra.
6. M.L.agrawal ,Cost Accounting, Sahitya Bhawan Publications,Agra.
7. S.P.Gupta ,Management Accounting , Sahitya Bhawan Publications,Agra.

MCA-405

Management Information System (Elective-II)

1. **Management Information System :** Definition, MIS as an evolving concept, MIS and other Academic Disciplines, Subsystems of an MIS.
   Structure of MIS : Elements of an Information System, MIS support for Decision making, MIS Structure and its different views.

2. **Hardware, Software, and communications** Technology for Information Systems.
   System & Design : Systems Development Initiative, Different Methodologies - Life Cycle & Prototype approach, Detailed study on Life Cycle Design & Implementation. Case Study.

3. **Managerial Decision Making :** Decision Making Process, Group Decision Support Systems,Architecture of GDSS, Categories of GDSS.

4. **Decision Support System :** Definition and Components of DSS (Data Base Management System,Model Base Management System, Support Tools), Applications of DSS, Functions of DSS.

5. **Planning and Control :** Definition of planning ,types , structure , Control definitions and its role in MIS**.**
    A study of Computerization in different functional areas of a typical manufacturing/business organization i.e Marketing, production, material, financial, personal.

Readings:

1. Management Information Systems ,Gordon B. Davis & Margerethe H. Olson Mc-Graw-Hill.
2 Management Information Systems ,Kenneth, Prentice Hall Publication.
3. Management Information Systems , T. Lucey , Thomson Learning.

MCA-501
Soft Computing

1. **Introduction** -What is soft computing, important soft computing techniques

2. **Artificial Neural Network** :Biological neural network Vs Artificial neural network, Neuron Model and Neural Network Architectures, ANN terminologies, ANN benefits, Supervised learning network :Error back propagation network, Perceptron learning (single layer only), Unsupervised learning network :Kohonen self organizing feature maps (SOM)

3. **Fuzzy Logic-**Crisp set Vs Fuzzy set, Operations on Fuzzy sets, Fuzzy relation, Membership function, Fuzzy arithmetic and Fuzzy measures

4. **Genetic Algorithm –** Introduction, representations of GA by binary and real-valued numbers, Genetic Operators and Parameters: Selection, crossover, mutation, elitism, Genetic Algorithms in Problem Solving

5   **Swarm Intelligence:** Meaning, Particle Swarm Optimization: basics, terminology, problem solving using PSO

Readings:

1. Principles of soft computing , S.N.Shivanandan and S.N. deepa Wiley India publication   ,First Indian edition ,2008.
2. A Comprehensive Foundation to Neural Networks , Simon Haykins , Prentice Hall
3. Fuzzy Sets and Fuzzy Logic: Theory and Applications , G. J. Klir, and B. Yuan, PHI learning ,2011.
4. Dr.G.Canon, Fuzzy Logic and Fuzzy Decision Making: Concepts and Applications, Galgotia Publication.
5. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.
6. Jang,Sun and Mizutani :Neuro-Fuzzy and soft computing :A computational Approach to learning and machine intelligence ,PHI learning ,2011.
7. N.K. Sinha & M. M. Gupta(Eds), Soft Computing and Intelligent Systems: Theory & Applications, Academic Press, 2000.

MCA- 502

Interactive Computer Graphics And Multimedia

1   **Fundamentals of Computer Graphics:** Concepts and applications, Random and Raster scan devices, input-output devices: CRT, LCD, laser printer. Output primitives: Line drawing algorithm: DDA and Bresenham's; Circle generating algorithm: Bresenham's Midpoint algorithms, Ellipse: midpoint ellipse drawing algorithm. Antialising techniques: super sampling, pixel weighting, area sampling, pixel phasing Area filling: boundary fill algorithm, flood fill algorithm: Scan-line Polygon Fill Algorithm.

2   **Transformation, viewing, Clipping:** 2-D Transformation: Translation, scaling, rotation, reflection, shear, matrix representation of all homogeneous coordinates, composite transformations. Two dimensional viewing: Viewing pipeline Window-to-view port transformation. Clipping operations: Line Clipping: Cohen Sutherland and Liang-barsky, Polygon Clipping: Cohen-Sutherland-Hodgeman and Weiler – Atherton Polygon clipping.

3   **3D Transformation, Visible Surface Detection and curves:** Visible Surface detection Algorithm: Object based and image based methods, depth comparison, A-Buffer, Back face removal, Scan-line method, Depth Sorting Method Area subdivision method. 3-D Transformation: translation, scaling, rotation, reflection. Three- dimensional object representations 3-D Viewing Projections – parallel and perspective projection. Curved lines and Surfaces: Spline representations, Interpolating and approximation curves, continuity conditions Bezier curves: concept and characteristics; B-Spline curves: concept and characteristics.

4   **Color Models and Basic Concept of Animation:** Introduction of multimedia: Properties and applications, types of medium, data stream characteristics, Basic File and Data format: BMP, JPEG, GIF, TIFF. Color models: RGB, YIQ, CMY, HSV. Animation: Basic concept, animation languages, computer-based animation, methods of controlling animation, display of animation, animation techniques: onion skinning, motion cycling, masking, morphing, and transmission of animation, Multimedia Authoring tools.

5   **Multimedia Systems:** Data compression: storage space, coding requirements. Source, entropy and hybrid coding some basic compression technique: runlength code, Huffman code. JPEG: Image preparation, Lossy sequential DCT –based mode, expanded Lossy DCT based mode, Lossless mode, and hierarchical mode. MPEG, Huffman Encoding, LWZ compression.

Readings:

1   Principles of interactive compo Graphics; W.M. Newman & Robert F Sproull.
2   Computer Graphics By Rogers TMH
3   Introductions to Computer Graphics AnirbanMukhopadhyay&Arup Chattopadhyay
4   Schaum's outlines -computer Graphics Mc Graw Hill International Edition.5
5   .Principles of Multimedia by Ranjan Parekh TMH
6   "Multimedia Systems Design", P. K.Andleigh& K. Thakrar, Prentice Hall Pvt. Ltd

MCA-503

Data Mining and Data Warehousing

1. **Data Mining:** Meaning, necessity, steps, Normal searching Vs. knowledge extraction

2. **Data Mining on different types of databases:** Relational, Data Warehouses, Transactional, Object oriented, Object relational, Spatial, Temporal and time series, Text and multimedia (i) Heterogeneous and legacy.

3. **Data Warehouse:** Meaning, definition, OLTP Vs. OLAP, Data cube, star, snow flake, constellations, basic concepts in writing of DMQL, Three Tier Architecture, Indexing.

4. **Data Preprocessing :** Noisy data, Inconsistent data, Data integration, Data transformation, Dimensionality reduction, Data compression.

5. **Classification, Clustering and Prediction:** Meaning, Neural network based classification, k-nearest neighbourhood (kNN) classifiers, Clustering, Types of Clustering, Partioning Method: k-means clustering, Prediction using Regression and Neural Network, Performance Measures.

Readings:

1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishes (Elsevier, 2nd edition), 2006
2. Data Mining Methods for Knowledge Discovery , Cios, Pedrycz, Swiniarski,Kluwer Academic Publishers, London – 1998.

MCA-504

Network Security (Elective-I)

1. **Foundations of Cryptography and security**

   Security trends, The OSI Security architecture Security attack, services and mechanism

   Ciphers and secret messages, Mathematical tools for cryptography: substitution techniques, modular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic.

2. **Symmetric Cipher**

   Symmetric cipher model, Design Principles of Block Ciphers, Theory of Block Cipher Design, Feistel cipher network structure, Data Encryption Standard (DES), Strength of DES Triple DES ,Modes of operation.Advance encryption Standard (AES)- Evaluation criteria of AES,AES cipher ,key distribution.

3. **Public Key cryptography and Hash function**

   Prime numbers and testing for primarily, factoring large numbers, Principles of public key cryptosystem, RSA algorithm. Key management: Diffie-Helman Key exchange, Hash and Message authentication Code (MAC), Hash and MAC algorithms, Digital signature.

4. **IP and Web security protocols:**

   Authentication application: Kerberos, Public key infrastructure .E-mail: Pretty Good Privacy (PGP), S/MIME. IP security, Web Security: Secure Socket layer (SSL) and Transport layer security, Secure Electronic Transaction (SET).

5. **System Security**: Firewall, and Intrusion Detection system (IDS), Malicious Software.

Readings:

1 . Cryptography and Network Security By William Stallings, 4th Edition Pearson Publication
2. Applied cryptography - protocols and algorithm By Buce Schneier, Springer Verlag 2003
3. Cryptography and Network Security By Atul Kahate , TMH Publication.
4. Cryptography and Network Security By Behrouz A. Forouzan, First Edition, TMH Publication.
5. Network Security:Private Communication in Public World By Charlie Kaufman,Radia Perlman and Mike Speciner ,PHI Publication.

MCA-505

Parallel Processing (Elective-II)

1   **Introduction to parallel processing:** Trends towards parallel processing; Parallelism in Uniprocessor systems: Basic Uniprocessor Architecture, Parallel Processing mechanisms, Multiprogramming and Time Sharing; Parallel Computer Structures: Pipeline computers, Array computers, Multiprocessor systems, Performance of Parallel Computers; Architectural classification schemes; Parallel processing applications.

2   **Principles of Pipelining and Vector Processing:** Principles of Linear Pipelining, Classification of Pipelined processors, General pipelines & Reservation tables, Instruction and Arithmetic Pipelines: Design examples and principles of design, Vector Processing: characteristics, Multiple Vector Task Dispatching, Pipelined Vector Processing methods. Architecture of Cray-I.

3   **Structure of Array Processors-** SIMD Array Processors: Organizations, Masking and Data Routing Mechanisms; SIMD Interconnection Networks: Static, Dynamic, Mesh-Connected, Cube Interconnection Networks, Shuffle Exchange, Omega Networks; Performance Enhancement methods; Associative Array processing: Associative Memory Organization, Associative Processors.

4   **Multiprocessor Architecture:** Functional Structures – Loosely Coupled and Tightly coupled multiprocessors; Interconnection Networks for multiprocessors: Crossbar Switch and multiport memories, Multistage Networks for multiprocessors; Exploiting Concurrency for multiprocessors, Parallel Memory Organizations: High order & Low order interleaved memory; Multiprocessor Scheduling strategies, Interprocess communication mechanisms: Process Synchronization Mechanisms, Synchronization with Semaphores, Conditional critical section & monitors.

5   **Algorithms on Array processors; Parallel Algorithms on Array Processors-** SIMD Matrix Multiplication, Parallel Sorting on Array Processors, SIMD Fast Fourier Transform, Parallel Algorithms of Multiprocessors-Classification of Parallel Algorithms, Synchronized Parallel Algorithms, Asynchronous Parallel Algorithms, Performance of Parallel Algorithms.

<u>**Readings:**</u>

1.   Computer Architecture & parallel Processing- Kai Hwang & A. Briggs (McGraw Hill)
2.   Designing Efficient Algorithms for Parallel Computers – H.J. Quinns (McGraw- Hill)
3.   Advanced Computer Architecture: parallelism, Scalability, Programmability- By:- Kai Hwang(TMH) 2. Computer Organization & Programming – By – Gear (TMH)
4.   Parallel Processing for Supercomputers & Artificial Intelligence –By – Hwang &Degroo

MCA- 601

MAJOR PROJECT

List of Electives

1. Theory of Computations
2. Web Technologies
3. Discrete Mathematics
4. Software Engineering
5. Communication Skills
6. Data Communication And Computer Networks
7. Visual basic .Net programming
8. Linux Operating System
9. Natural Language Processing
10. C# Programming
11. PHP based WEB Designing
12. Mainframe Software
13. E Commerce
14. Image Processing
15. Financial Accounting
16. Data Warehousing and BIG DATA
17. Introduction to Parallel Processing

GUIDELINES FOR PROJECT WORK (MCA)

A project report has to be submitted as per the rules described. Some additional guidelines regarding the Project Report are:

Number of Copies:

The student should submit One hardbound copy of the Project Report with one RW/CD/DVD.
Acceptance / Rejection of Project Report:

The student must submit a project report to the Head of Department/Project Guide for approval. The Head of Department/Project Guide holds the right to accept the project or suggest modifications for resubmission.

Format of the Project Report :

The student must adhere strictly to the following format for the submission of the Project Report **a. Paper**

The Report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The Report to be submitted to the University must be original and subsequent copies may be photocopied on any paper.

b. Typing

The typing shall be of standard letter size, double-spaced and on one side of the paper only, using black ribbons and black carbons.

c. Margins

The typing must be done in the following margins

Left ----- 35mm,   Right   ----- 20mm
Top ----- 35mm,   Bottom ----- 20mm

d. Binding

The Report shall be Rexene bound in black. Plastic and spiral bound Project Reports not be accepted. **e. Front Cover:**

The front cover should contain the following details:

TOP   **:** The title in block capitals of 6mm to 15mm letters.
CENTER   **:** Full name in block capitals of 6mm to 10mm letters.
BOTTOM   **:** Name of the University, year of submission- all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and
centering. **f. Blank Sheets**

At the beginning and end of the report , two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

Abstract

Every report should have an Abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters, section, subsection etc.

The report should contain the following:

> Certificate from Company
> Institute Certificate: Successful completion of project by competent authority.
> Acknowledgments
> Abstract
> List of Figures
> Tables
> Nomenclature and Abbreviations

Contents of the Project Report

1. Company Profile (only for M.I.S. projects)
2. Introduction to the project
3. Scope of work.
4. Existing System and Need for System.
5. Operating Environment - Hardware and Software.
6. Proposed System.

      6.1 Objectives to be fulfilled

      6.2 User Requirements

      6.3 Requirements Determination Techniques and Systems Analysis Methods Employed.

      6.4 Prototyping.

      6.5 System Features

            -Design of Input

            -Design of Output screens and reports -Module specifications

            -D.F.D.'s and ER's - System flow charts - Data Dictionary - Structure charts - Database /File layouts -User Interfaces - Coding system

            -Design of Control Procedures - Design of Exception Handling

7. Testing procedures and Implementation Phases
8. Acceptance Procedure
9. Post-Implementation Review
10. User Manual

      Menu explanation
      -User guide
      -Expected problems/errors and their solutions

11. Problems encountered
12. Drawbacks and Limitations
13. Proposed Enhancements
14. Conclusions
15. Bibliography

Annexure:

      -Sample documents (manual or computer generated) -Source code listing in a separate file
      -Output reports

List of Tables:

The Contents shall be followed by a 'List of Tables' indicating the table number, table title and the corresponding page number(s).The table number shall be in decimal point notation indicating the chapter number and the table number in that chapter.

NOTE : Any reference within the text shall be given by quoting relevant number.eg: 'Table5.2'

List of Figures:

The 'List of Figures, shall follow the 'List of Tables' indicating the figure numbers, figure titles and corresponding page number. The figure numbers shall be in decimal point notation.

Nomenclature and Abbreviations:

The 'Nomenclature and Abbreviations' shall follow the 'List of Figures' and contain the list of symbols and abbreviations and their long names used. The nomenclature should be given for ER's, DFD's, STRUCTURED CHARTS, and RUN CHARTS and for all other symbols in the techniques used. The nomenclature for every technique should appear on a separate sheet. As far as possible, accepted standard symbols shall be used.

Chapter Numbering:

The Chapters shall be numbered in Arabic numerals. Section and subsections of any chapters shall be in decimal notation. All chapters shall begin on a new page. The titles for the chapters and the title shall be properly centered at the top of the page and have three spaces between them.

Company Profile:

This chapter should highlight the company details. This would be chapter 1 and should include the main stream activity of the company, the product line of the company and the details of the department where the student was working. This should not exceed two pages or 800 words.

N.B. : Only relevant for M.I.S. Projects.

Introduction:

The 'Introduction' shall highlight the purpose of project work It will also define the chapters to be followed in the Project Report.

Existing System and the Need for the System:

If there is some system already in use, then a brief detail of it must be included, to help the examiner understand the enhancements carried out by6 the student in the existing system. Based on this, the student should exemplify the need for the computerization should be given.

N.B. : Only where relevant.

Proposed System :

1. Objectives : clearly define the objective(s) of the system in a few lines.

2. User Requirements : State the requirements of the use in an unambiguous manner.

3. Requirements Determination Techniques and System Analysis Methods Employed:

Use the formal methods to describe the requirements of the use. Like Fact Finding Methods, Decision Analysis, Data Flow Analysis etc.

4. Prototyping : If the prototypes has been developed prior to the detailed design , then give details of the prototype.

5. System Features :

    5.1 Design of Input :Inputs, Data Dictionary, Screens.

    5.2 Design of Output :Outputs, Reports etc.

    5.3 Design of Control Procedures : Structured charts, Module Specifications, Run charts etc.

5.4 Design of Exception Handling : Error handling and recovery procedures.

The choice of including topics in this chapter entirely depends on the student. The freedom given for this chapter is obvious.

Students will be working on various types of projects. A typical M.I.S. development project must

include DFD's and structured charts etc. Thus a student is allowed to employ the techniques of his/her own choice suitable to his/her work. However, there is a guideline that the student must employ the techniques taught during the MCA course.