MCA Syllabus

P.G Department of Computer Applications

UNIVERSITY OF JAMMU, JAMMU

PROPOSED SCHEME OF MCA COURSE STRUCTURE YEAR-2012

Semester-wise Course Distribution and Paper-wise Outline of Masters Degree In Computer Application [MCA] Programme

Semester - I

Course No.	Title	Credits	Max. Marks		Total
			Sem. Exam.	Int. Assessment	
MCA-101	Mathematical Foundation of Computer Science	4	80	20	100
MCA-102	Problem Solving & Programming in C	4	80	20	100
MCA-103	Computer Organization & Assembly Language	4	80	20	100
MCA-107	Operating System Principles	4	80	20	100
MCA-190	Practicals *(based on all the above courses using C on Windows/Linux platform)*	8	75	75	150
Semester-I Total: -		24	395	155	550

Semester-II

Course No.	Title	Credits	Max. Marks		Total
			Sem. Exam.	Int. Assessment	
MCA-203	Data Structures using C-Language	4	80	20	100
MCA-208	Database Management System & Oracle	4	80	20	100
MCA-209	Computer Architecture & Microprocessor	4	80	20	100
MCA-210	Object Oriented Concepts using C++	4	80	20	100
MCA-211	Discrete Mathematical Structures	4	80	20	100
MCA-290	Practicals *(based on all the above courses preferably using C++)*	8	75	75	150
Semester-II Total: -		28	475	175	650

Semester-III

Course No.	Title	Credits	Max. Marks		Total
			Sem. Exam.	Int. Assessment	
MCA-308	Computer Networks	4	80	20	100
MCA-309	Software Project Management	4	80	20	100
MCA-310	Algorithm Design & Analysis	4	80	20	100
MCA-311	Computer Graphics	4	80	20	100
MCA-312	Application Programming using Java	4	80	20	100
MCA-390	Practicals *(based on all the above courses)*	8	75	75	150
Semester-III Total: -		28	475	175	650

Semester-IV

Course No.	Title	Credits	Max. Marks		Total
			Sem. Exam.	Int. Assessment	
MCA-411	Web Technologies	4	80	20	100
MCA-420	Theory of Computation	4	80	20	100
MCA-421	Data Mining & Data Warehousing	4	80	20	100
MCA-422	Numerical & Statistical Computing	4	80	20	100
Elective-I MCA-416 MCA-417 MCA-418 MCA-419	*(any one of the following)* Simulation & Modelling VB.Net & Windows Programming VLSI & Embedded Technology Programming Paradigms	4	80	20	100
MCA-490	Practicals *(a Mini Project is to be given to the student as a part of the regular assignment*	8	75	75	150
Semester-IV Total: -		28	475	175	650

Semester-V

Course No.	Title	Credits	Max. Marks		Total
			Sem. Exam.	Int. Assessment	
MCA-504	Artificial Intelligence	4	80	20	100
MCA-510	Optimization Techniques	4	80	20	100
MCA-511	Principles of Complier Design	4	80	20	100
MCA-518	.NET Technology & C#	4	80	20	100
Elective-II MCA-514 MCA-515 MCA-516 MCA-517	*(any one of the following)* Parallel & Distributed Processing Image Processing Mobile Technologies Neural Networks	4	80	20	100
MCA-590	Practicals *(based on all the above courses)*	8	75	75	150
Semester-V Total: -		28	475	175	650

MCA-VIth Semester

MCA-601

Project work: 25 credits

The project in sixth semester shall carry 400 marks distributed as follows:

Project Component		**Marks**
Mid-Semester Presentation & Internal Evaluation		100
End-Semester Evaluation	Project Evaluation	200
	Project Viva-voce	100
Semester-VI Total: -		400

PASSING CRITERIA

The minimum number of marks required to pass each theory paper and practical paper from Semester-I to V shall be 40% (separately in the internal assessment and the university examination).
The minimum number of marks required to pass Project work in VI semester examination shall be 50%.
The candidate must pass the MCA examination within six years of the initial admission to the first semester of the course as a regular candidate.

ATTENDANCE REQUIREMENT

The minimum attendance requirement for a regular student to appear in a Semester Examination is 75% of the total number of lectures and seminars (as per syllabus) conducted in the semester. The Head of the Department may condone shortage in attendance of a student in a semester upto five attendances in each course.

A candidate who falls short of attendance in more than half the total number of courses in any semester shall have to apply for new admission/enrolment in that semester in order to earn fresh eligibility to appear in the examination.

A candidate who falls short of attendance in half or less than half the total number of courses in any semester and promoted to next semester after fulfilling the conditions as per MCA statues , shall have to repeat those courses alongwith the candidates of next academic session, the department will make arrangements of extra classes for such students.

SCHEME OF EVALUATION

Theory Courses

Each theory paper shall be of total 100 marks in case of 4 credit course and 50 marks in case of a 2 credit course. The distribution of marks is as follows:

Examination	**Weightage**
Written Examination *(at the end of each semester to be conducted by the university)*	80%
Internal Assessment	20%

Internal Assessment

For each course, there shall be two tests/assignments. The scheme of internal assessment is as follows:

Course	Test/Assignment-I	Test/Assignment-II	Attendance	Total
Four Credit Course	8 marks	7 marks	5 marks	20 marks
Two Credit Course	4 marks	3 marks	3 marks	10 marks

SCHEME FOR PAPER SETTING

For a course of 4 credits

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

Section A
Total of 10 short answer questions (2 from each Unit) shall be set and the candidates are required to answer one question from each unit. Answer to a question should not exceed 50 words. Each question shall be of 7 marks.

(35 marks)

Section B
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any three questions. Answer to each question should not exceed 800 words. Each question shall be of 15 marks.

(45 marks)

For a course of 2 credits

Section A
Total of 6 short answer questions (2 from each Unit) shall be set and the candidates are required to answer one question from each unit. Answer to a question should not exceed 50 words. Each question shall be of 6 marks.

(18 marks)

Section B
It will contain three long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 800 words. Each question shall be of 11 marks.

(22 marks)

Practical Courses

Each practical course carries 150 marks distributed as follows:

Practicals				**Marks**
Internal Evaluation	I	Program Implementation & Viva-Voce	55 marks	75
	II	Practical File	10 marks	
	III	Attendance	10 marks	
External Evaluation				75
Total				150

Internal Evaluation

Guidelines for internal Assessment of practical courses

- Performance of the students will be evaluated based on a comprehensive system of continuous evaluation.
- For each practical course, students will be given regular assignments by the concerned practical teachers.
- The Implementation of assignments will be assessed & evaluated and viva-voce will be conducted atleast once in every fifteen days and then a set of further assignments may be given.
- Record of the Internal evaluation components I(Program Implementation & Viva-voce) shall be maintained regularly by the concerned teachers.
- At the end of the semester the Internal evaluation components II(Practical File) & III(Attendance) will be evaluated and consolidated with the record of components I to prepare the final award for Internal Practicals.

External Evaluation

The practical examination shall be conducted by external and internal examiners. The external examiner shall be the incharge of the practical examination and will decide the distribution of marks for various components of the examination in consultation with the internal examiner.

CRITERIA FOR PROMOTION OF A STUDENT TO NEXT HIGHER SEMESTER

Semester-I to Semester-II

The candidates shall be enrolled in second semester provided they secure pass marks in internal assessment in all the courses of first semester and who are otherwise found eligible under the MCA statutes.

Semester-II to Semester-III

The admission to third semester shall be open to only those candidates who secured pass marks in at least 12 credit's courses of first semester in the University examination and in the internal assessment in all courses of second semester.

Semester-III to Semester-IV

The candidates shall be enrolled in fourth semester provided they secure pass marks in internal assessment in all the courses of third semester and who are otherwise found eligible under the MCA statutes.

Semester-IV to Semester-V

The admission to fifth semester shall be open to only those candidates who secured pass marks in at least 12 credit's courses of third semester in the University examination and in the internal assessment in all courses of fourth semester.

Semester-V to Semester-VI

The candidates shall be enrolled in sixth semester provided they secure pass marks in internal assessment in all the courses of fifth semester and who are otherwise found eligible under the MCA statutes.

MCA - FIRST SEMESTER

Duration of the Examination: 3 Hrs Theory Examination = 80

Total Marks = 100 Internal Assessment = 20

COURSE NO: MCA-101

COURSE TITLE: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

UNIT – I

Sets, Relations and Functions:

Definition of Sets and Subsets; Intersection, Union and Complements, Demorgan's Law; Cardinality; Relations - Equivalence relation etc. Mapping One-one Onto etc. Groups, Rings, Fields. Homomorphism and isomorphism. 10 HOURS

UNIT – II

Logic & Methods of Proof:

Propositions, Connectives, Well formed formulas, Truth Tables, Equivalence of WFF, logical identities, semantics, Normal forms of WFF, reasoning, disjunctive normal form, principle disjunctive normal form, conjunctive normal form, predicate calculus, rules of inference.

Direct proof, Indirect Proofs, Counter examples, Proof by Induction, Strong and weak induction.

10 HOURS

UNIT – III

Number Theory:

Modulo arithmetic, Congruence and their applications, Multiplicative inverse, Euler's extended algorithm, Fermat's little theorem, Totient function, Euler's theorem, primitive roots, discrete logarithms, split search algorithm, Chinese remainder theorem.

Prime numbers, Number bases, Primarily testing, discrete logarithm, primitive roots, Number sieves, Quadratic Residues.

10 HOURS

UNIT – IV

Coordinate Geometry:

Cartesian Coordinates, Two dimensional coordinate system, Point, locus of a point, Line, Slope of a line, Regular geometric shapes, special points in triangles, angle between two straight lines, Distance between two parallel lines; Circle, parametric equation, relative position of line and circle, tangents and chords, Conic Section, Parabola, Ellipse, Hyperbola.

Three dimensional coordinate system, Lines and planes, simple curves and surfaces, parametric equations, Homogeneous coordinates, Euclidean transformations, affine and projective transformations, Introduction to Polar, cylindrical, and spherical coordinates.

10 HOURS

UNIT – V

Vector Algebra:

Definition of Vector, Types of Vectors, Vector Arithmetic, Laws of vector, Collinear vectors, Coplanar vectors, Vector products, Orthogonal and Orthonormal vectors, Scalar and Vector Projection.

10 HOURS

SUGGESTED READINGS:

1. Modern Algebra by Prof. M.R. Puri and Dr. Raj Krishan Publisher: Malhotra Brothers
2. Trembley, J.P. and Manohar, R.P.: Discrete Mathematical Structures with Applications to Computer Science. McGraw-Hill.
3. Lew: Computer Science: A Mathematical Introduction, Prentice – Hall International (Paperback Edition).
4. Kenneth. H. Rosen: Discrete mathematics and its applications 3rd Edition, McGraw Hill international edition.
5. Algebraic Number Theory by Serge. Lang, Springer; 2nd edition.
6. Elements of Vector Algebra by B.L. Raina Publisher: Malhotra Brothers
7. Vector Algebra by R. Gupta Publisher: Laxmi Publishers (P) Ltd.

MCA - FIRST SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-102
COURSE TITLE: PROBLEM SOLVING & PROGRAMMING IN C

UNIT-I

Problem Soving & C Basics:
Steps for problem solving, Computer as a tool for problem solving. Program Design tools: Algorithm, Psuedocode and Flowchart Designing.
History of C, Characteristics of C, Introduction to GCC, compiling, linking and running a C – program , Using MAKE Utility.
C Program Structure, Data Types, Variables and Constants, Printing Out and Inputting Variables, Constants, Type-Casting, Operators and Expressions, Order of Precedence. 10 HOURS

UNIT-II

Control Statements & Arrays:
Conditional Statements, Program Loops and Iteration, Library functions. Syntax, semantic, linker, logical and runtime errors.
Single and Multi-dimensional Arrays, Strings, Basic String Handling Functions.
10 HOURS

UNIT-III

Functions & Further Data Types:
Functions, Passing Parameters, Recursion, Storage classes. Standard C Preprocessor Directives. Standard Formatted & unformatted I/O Functions;
Defining New Data Types, Structures, Unions, Enumerated Types, Bitwise Operators, Bit Fields.
10 HOURS

UNIT-IV

Pointers & Files:
Pointers: Pointers arithmetic, const and void pointers. Dynamic Memory Allocation, Pointers to Pointers, Pointer to array, Array of pointers, Command line input, Pointers to a Function.
Files Character and Line Based I/O, Formatted I/O, Block I/O, File Positioning.
10 HOURS

UNIT-V

File Accessibility & Graphics Programming:
File Accessibility and Directories (access, stat, chmod, chown …, chdir, chroot…), Process Control: (Running Linux Commands from C, fork(), the exec family, wait(), exit())
Graphics Programming: OpenGL Basics, OpenGL Utility Toolkit (GLUT), Defining window, Display mode, OpenGL Functions, Primitives (Points, Lines, Polygons) and Attributes, Simple graphics programs.
10 HOURS

SUGGESTED READINGS:

1. B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PHI., 2000.
2. Behrouz A. Forouzan and Richard F. Gilberg, "Computer Science A Structured Programming Approach Using C", PHI, 3rd Ed., 2007.
3. Jeri R. Hanly and Elliot B. Koffman, "Problem Solving and Programming in C", Pearson, 5th Ed. 2007.
4. Yashwant Kanetkar, "Let us C", BPB Publications, 2002.
5. Edward Angel, "OpenGL- A primer", 3rd Ed. , Addison-Wesley 2007.
6. Kurt Wall, Mark Watson, and Mark Whitis, "Linux Programming Unleashed", SAMS.
7. Mark Mitchell, Jeffrey Oldham, and Alex Samuel, "Advanced Linux Programming",New Riders Publishing, 2001.
8. Edward Angel, "Interactive Computer Graphics", 5th Ed. , Addison-Wesley 2009

MCA - FIRST SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-103
COURSE TITLE: COMPUTER ORGANIZATION & ASSEMBLY LANGUAGE

UNIT - I

Binary Systems:
Overview of digital computers, Binary Numbers, Number systems, Number based Conversions, Integer & floating point representation using IEEE FORMAT, Rules of Floating point Arithmetic, parity, Error detection and correction methods using Hamming technique, ASCII code representation, Rules of addition/subtraction for r's, (r - 1)'s complements, BCD, excess – 3 codes.

10 HOURS

UNIT - II

Boolean Algebra & Logic Gates:
Basic Theorems and functions, Boolean Expressions, Laws of Boolean Algebra, De – Morgan laws, simplification of Boolean Expressions using SOP, POS, K–map. Logic gates, AND, OR, NOT, NAND, XOR, NOR, XNOR Gates & their design.

10 HOURS

UNIT - III

Combinational Circuits:
Introduction, Half & Full adders & subtractors, parallel adders and subtractors. Encoder, decoder, Multiplexer, De - Multiplexer, code converters.

10 HOURS

UNIT - IV

Sequential circuits & Memory organization:
Sequential circuits, Basic memory cell, Flip-flops and their types, triggering of flip flops, Registers and their types, bi-directional register.
Memory Hierarchy, Memory and its types, characteristics of memory, memory address map to CPU, cache memory.
I/O devices FD/HD disks, VDU; I/O organization, Modes of I/O transfer like DMA, programmed control, interrupts technique.

10 HOURS

UNIT - V

Microprocessor & Assembly Language:
Microcomputer organization, microprocessor organization, Instruction set, addressing modes, stack, subroutines and interrupts, memory organization and I/O interface.
Need and use of Assembly Language, Types of Assemblers (TASM and MASM), assembly Language programming structure, Instruction Sets (operands and opcodes), description of Registers, writing and executing simple assembly programs. 10HOURS

SUGGESTED READINGS:

1. Gear, C.W.: Computer Organization and Programming McGraw – Hill.
2. Tannenbaum, A.S.: Structured Computer Organization Prentice - Hall of India.
3. Mano, M.M.: Computer System Architecture, Prentice – Hall, of India.
4. Langholz, G., Grancioni, J. and Kandel, A.: Elements of Computer Organization, PHI.
5. Assembler Manual for the chosen machine.
6. Hayes: Computer Architecture and Organization, McGraw – Hill International Edition.
7. Sloan, M.E.: Computer Hardware and Organization, 2nd Edn, Galgotia publ. Pvt. Ltd.
8. Floyd: Digital Fundamentals, 3rd edn, Universal bookstall, and pvt.ltd
9. R. K Gaur: Digital Electronics and microprocessor - dhantpat Rai pub.
10. Peter Abel: Assembly language and Programming
11. George W. Gorsline: Assembly and assemblers, Prentice hall International Edition.

MCA - FIRST SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-107

COURSE TITLE: OPERATING SYSTEM PRINCIPLES

UNIT-I

Introduction to Operating Systems:

Evolution of operating systems, operating systems concepts, types of operating systems, different views of the operating system, operating system services, System calls, Types of system calls. Operating system Structure, Layered Approach, Microkernels, Virtual machines.

10 HOURS

UNIT – II

Process Management:

Process concept, operation on processes, Inter-process communication, mutual exclusion, Process scheduling, Basic Concepts, Scheduling criteria, Scheduling algorithms,

Process Synchronization, Inter process Synchronization, Critical section Problem, Semaphores, Monitors, Message passing.

Deadlocks, System Model, Deadlock characterization, Deadlock prevention, Deadlock avoidance.

10 HOURS

UNIT – III

Memory Management:

Memory management, swapping, contiguous memory allocation, relocation & protection, Memory management, Paging, Segmentation, Intel Pentium Segmentation, Intel Pentium Paging, Virtual memory, demand paging, performance of demand paging, Page replacement algorithms: FIFO, Optimal, LRU, Counting based page replacement.

10 HOURS

UNIT – IV

File & I/O Management:

Files system structure, file system implementation, Directory Implementation.

Allocation Methods, contiguous allocation, Linked allocation, Indexed allocation Disk organization, disk space management, disk scheduling, Disk Management, RAID Structure.

10 HOURS

UNIT –V

Introduction to LINUX/UNIX:

Various parts of operating system, kernel, important parts of kernel;

Files and Directories: pathname; Directory Tree; current working directory; relative pathname; referring to home directories; device files; File permissions; Pipes; tees; mount, init, Files, Directories, Processes Commands: pwd, mkdir, rmdir, ls, cat, more, mv, cp, rm, diff, wc, pwd, wc, who write, who am i, passwd, ps, kill, date, cal, man, gzip, df, chmod, mkdir, cd. Filters: pr, head, tail, cut, paste, sort, uniq, nl, tr. Regular Expression: grep; egrep; fgrep

Vi-Editor, adding and replacing text, commands in Command mode, deletion, navigation, pattern search, repeating commands, undoing last command.

Shell Programming, Shell Script, Logical Operators, If else Statement, Case structure, Looping.

10 HOURS

SUGGESTED READINGS:

1. Silberschartz, Galvin, Gagne: Operating System Concepts 8th edition, WSE wiley.
2. Andrew. S. Tanenbaum: Modern operating systems, Pearson Prentice Hall.
3. Milenkovic M: Operating system-concepts and design, McGraw hillinternatinal editions.
4. A S Godbole: Operating systems, tata McGraw hill.
5. Deitel H. M. : An Introduction to operating system, addison- Wesley publications.
6. Madnick & Donovan: Operating systems, mcgraw-hill book co.
7. Sumitabha Das- UNIX Concepts and Application, Tata McGraw Hill
8. Richard L. Petersen, The Complete Reference Linux, Tata McGraw Hill

COURSE NO: MCA-190
PRACTICALS

Practicals will be based on following Papers:

1. Mathematical Foundation Of Computer Science (MCA-101)
2. Problem Solving & Programming In C (MCA-102)
3. Computer Organization & Assembly Language (MCA-103)
4. Operating System Principles (MCA-108)

MCA - SECOND SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-203
COURSE TITLE: DATA STRUCTURES USING C-LANGUAGE

UNIT - I

Fundamental Notations:
Primitive and composite data types, self-referential structures, Algorithms, Types of data structures, Operations, Time and space complexity of algorithms, Asymptotic notation.
10 HOURS

UNIT – II

Linear Data Structures:
Arrays, Linked lists, Stacks, Queues, operations and their complexities, Implementations, Applications.
10 HOURS

UNIT – III

Non-Linear Data Structures:
Trees, Binary Trees, Traversing binary trees, Threaded binary trees, Binary search trees, heaps, Graphs, Traversing graphs.
10 HOURS

UNIT – IV

Indexing Structures:
ISAM, m-way trees, B – trees, B+ – trees, Hashing techniques for direct access, collision in hashing, collision resolution.
10 HOURS

UNIT – V

Sorting:
Internal and External sorts, Bubble sort, Insertion sort, Selection sort, Shell sort, Quick sort, Radix sort, Merge sort, Types of merging.
10 HOURS

SUGGESTED READINGS:

1. G. A. V. Pai, Data Structures and Algorithms: Concepts, Techniques and Applications, Tata Mcgraw Hill, 2008.
2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, Universities Press, 2008
3. J. P.Tremblay & P. G. Sorenson, Introduction to Data Structures with Applications, TMH, 2007.
4. Seymour Lipschutz, Theory and Problems of Data Structures, Sehaum's Outline Series in Computers Tata McGraw-Hill, 2006
5. A. M. Tannenbaum & M..J. Augenstein and Y. Langsam, Data Structures with C, PHI, 2006.

MCA - SECOND SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-208
COURSE TITLE: DATABASE MANAGEMENT SYSTEM & ORACLE

UNIT - I

Database Management System Concepts:
File based system, Need of Database Management System, Components of DBMS, Data independence, Three level architectural of Database, Centralized and client server architecture for DBMS, Introduction to hierarchical and network data models, Conventional file organizations, Inverted files.

10 HOURS

UNIT - II

Relational Data Model:
Relational data models, Entity relationship model, Conversion of ER diagrams to Relational Database Design, Joins, Relational algebra and relational calculus concepts, Queries using relational algebra and calculus, QBE.

10 HOURS

UNIT – III

Normalisation and Concurrency Control :
Concept of keys, Functional dependencies, Inference rules, Covers, Closure, Equivalence of functional dependencies, Multivalued dependencies, Theory of normalization, Normal forms (1st to 5th).
Transaction processing, Deadlocks, Concurrency control, Locking techniques, Timestamp ordering, Recovery management, Recovery techniques.

10 HOURS

UNIT – IV

SQL using Oracle:
SQL query processing, Table creation and management, Inbuilt functions, Data integrity constraints, Views, Joins, Operators, Privileges, roles and security policies.

10 HOURS

UNIT - V

Oracle PL/SQL:
Architecture, Fundamentals, PL/SQL control structure, Exception handling, Cursor management, Procedures and functions, Packages Database triggers.

10 HOURS

SUGGESTED READINGS:

1. Bipin C.Desai: An Introduction to Database Systems, West-publishing company.
2. Elmasri, Navathe, Somayajulu, Gupta: Fundamentals of Database Systems, Pearson Education.
3. Date, C.J.: An Introduction to Database Systems Addison Wesley Pearson Education.
4. Narayan S Umanath, Richard W Scamell : Data Modelling and Database Design, Thomson Course Technology India Edition.
5. R.A. Parida, Vinod Sharma: The power of Oracle 9i, Firewall Media Publications.
6. Desh Pande: SQL/PL for Oracle 8 & 8i.

MCA - SECOND SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-209
COURSE TITLE: COMPUTER ARCHITECTURE & MICROPROCESSOR

UNIT – I

Digital Electronics:
Semi-conductor, p-type, n-type formation, pn junction & its characteristics, Bipolar and MOSFET transistors as current controlled and voltage controlled Switch, Basic design for AND, OR, NOT, NAND, NOR using RTL, DTL, TTL, MOS Technology, Tristate logic

10 HOURS

UNIT – II

Sequential Circuits & Computer Arithmetic:
Sequential circuits: Sequence generator, counters, A/D & D/A converters.
Computer Arithmetic: Flowchart, Hardware design & algorithm for signed magnitude & 2's complement form for addition, subtraction, multiplication & division methods, floating point arithmetic.

10 HOURS

UNIT – III

Memory & Register Organization:
Memory: 2D/3D Static RAM, Static and Dynamic Memory, Types of ROM, associative memory and interleaved memory, Random access, Sequential access, direct access, virtual memory, cache memory.
Register transfer logic and micro-operation.

10 HOURS

UNIT – IV

Microprocessor & Control Design:
Internal structure of MPU, ALU & Micro-programmed control unit. Instruction format, Bit Slices, I/O interface adapter (Serial and Parallel), Memory read, Memory write, Memory map and I/O map, Interrupts and its types.

10 HOURS

UNIT – V

Parallel Processing and VHDL:
Classification of parallel machines, pipeline processing, Vector processing, multiprocessor system architecture-multiport memory, crossbar switch, timeshared common-bus, dual-bus, Bus arbitration.
VHDL: Introduction, Need and importance of VHDL, characteristics, basic components of VHDL.
10 HOURS

SUGGESTED READINGS:

1. Malvino, A.P., Leach, D.P.: Digital Principles and Applications,Tata McGraw-Hill.
2. Millman and Halkias: Integrated Electronics, McGraw-Hill.
3. Strangio, C.E.: Digital Electronics – Fundamental Concepts and sons.
4. Khambata, J.: Microprocessor and Microcomputer, John Wiley and Applications, PHI.
5. Liu, Y.Gibson, G.A.: Microcomputer Systems: The 8086/808¸ Family, PHI 2nd Edn..
6. Alexandridis Nikitas, A.: Microprocessor System Design Concepts, Galgotia Publications.
7. Stone, S.: Introduction to Computer Architecture, Galgotia Publications,2nd Edn.
8. Mano, M.M.: Computer System Architecture, Prentice-Hall.
9. Volnei A. Pedroni: Circuit design with VHDL.

MCA - SECOND SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-210
COURSE TITLE: OBJECT ORIENTED CONCEPTS USING C++

Unit – I

The Object Oriented Methodology and C++ basics:
Paradigms of Programming Languages, Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language, Applications of OOPs, Object-based programming languages.
Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C and C++. Basic program construction, working with variables and const qualifiers.

10 HOURS

Unit – II

Programming Constructs:
Input output statements: cin, cout, comments, escape sequence, manipulators, type conversion, operators, and library functions.
Control statements, Structures, Enumeration, Functions, passing arguments to functions, reference arguments, overloaded functions, inline functions, default arguments, variables and storage class and returning by reference, Arrays and Strings.

10 HOURS

Unit – III

Classes & Operator Overloading:
Objects and Classes, defining class, c++ objects as physical objects, c++ objects and data types, object as function argument, constructors, as function argument, overloaded constructors, copy constructors, returning objects from functions, this pointer, structures and classes, static class data, static functions, friend functions, const and classes, array of objects.
Overloading unary and binary operator, Data conversions (built-in & user defined data types). 10 HOURS

Unit – IV

Inheritance & Virtual Functions:
Inheritance concept, derived class and base class, derived class constructors, overloading member functions, class hierarchies, public, private & protected inheritance, levels of inheritance, multiple inheritance,Virtual Inheritance, new and delete operator.
Early & late binding, Virtual functions.

10 HOURS

Unit – V

Files I/O & Generic Programming:
File Input/Output & Exception Handling: Using istream/ostream member functions, Understanding implementation of Files, Writing and Reading Objects. Understanding of working and implementation of Exception Handling.
Understanding Generic Functions with implementation of searching sorting algorithm. Understanding Class Templates using Implementation of Generic stack, linked lists, Understanding Components of Standard Template Library, Working of STL Elements. 10 HOURS

SUGGESTED READINGS:

1. Bjarne Stroustrup, The C++ Programming Language, (3rd edition), Addision Wesley.
2. Herbert Schildt, C++ The Complete Reference, McGraw Hill.
3. Robert Lafore, Object Oriented Programming In C++, Galgotia publ.
4. E.Balagursamy , Object Oriented Programming using C ++ ,Tata Mcgraw Hill.
5. D. Ravichandran,"Programming with C++", Tata Mcgraw Hill.
6. Scott Meyers, Effective C++: 50 Specific Ways to Improve Your Programs and Designs, Addison Wesley.
7. S. B. Lippman and J. Lajoie, "C++ Primer", 3rd Edition, Addison Wesley.
8. Bruce Eckel, "Thinking in C++", President, Mindview Inc., Prentice Hall, 2nd Ed.

MCA - SECOND SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-211
COURSE TITLE: DISCRETE MATHEMATICAL STRUCTURES

UNIT - I

Counting Techniques:
Basics of counting pigeon hole principles, permutation and combination, Recurrence Relations & their solution (Homogeneous & non-homogenous), Decision trees, Divide & Conquer Relations function, Decision trees.

10 HOURS

UNIT - II

Posets, Hasse Diagram and Lattices:
Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, and complemented lattices.
Introduction to fuzzy systems, fuzzy sets, equality of fuzzy sets, normal fuzzy sets, containment, support of a fuzzy set. Alpha-level sets. Basic operation of Fuzzy sets.

10 HOURS

UNIT - III

Graphs:
Introduction to Graphs; Incidence and degree; Handshaking Lemma; Isomorphism; Subgraphs and Union of graphs; connectedness; Walks, Paths and Circuits; Components; Connectedness Algorithm, shortest path Algorithms, Eulerian graph; Fleury's algorithms, Hamiltonian graph - Necessary conditions and sufficient conditions; Travelling saleman problem; Bipartite graphs; Directed Graphs, Binary relations, connectedness in directed Graph.
Matrix representations of graph: Incidence; Adjacency matrices and their properties.

10 HOURS

UNIT - IV

Trees:
Properties of trees; Pendant vertices in a tree: Center of a tree; Rooted an binary trees; Spanning Trees – spanning tree algorithms; Fundamental circuits; Spanning trees of a weighted graph, cutsets and cut-Vertices; Fundamental cutsets; connectivity and separativity.

10 HOURS

UNIT - V

Planar graphs & Colouring:
Combinatorial and geometric dual; Kuratowski's graphs; Detection of planarity; Thickness and crossings.
Colorings: Vertex coloring, Chromatic number; Chromatic polynomial, The four colour problem, edge coloring, Coloring algorithms.

10 HOURS

SUGGESTED READINGS:

1. Harry, F.: Graph Theory: Addison - Wesley Publ. Camp.
2. Trembly, J.P. and Manohar, R.P.: Discrete Mathematical Structures with Applications to Computer Science, McGraw - Hill.
3. Deo, N.: Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall Inc..
4. Krishnamurthy, V.: Combinatorics: Theory and Applications,Affiliated East-West Press Pvt. Ltd.
5. Doerr, A. and Levasseur, K.: Applied Discrete Structures of Computer Science, Galgotia Publications Ptv. Ltd.

COURSE NO: MCA-290
PRACTICALS

Practicals will be based on following Papers:

1. Data Structures Using C-Language (MCA-203)
2. Database Management System & Oracle (MCA-208)
3. Computer Architecture & Microprocessor (MCA-209)
4. Object Oriented Concepts Using C++ (MCA-210)
5. Discrete Mathematical Structures (MCA-211)

MCA –THIRD SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 308 | No. of Credits = 4

TITLE: COMPUTER NETWORKS

Unit I Fundamentals of Communication

Fundamentals of Communication, Modulation, Data Encoding, OSI reference model,

TCP/IP model, network standardization, Inter-networking

Physical layer, Switching Technique, Transmission media, Co-axial, Twisted Pair and Fiber Optic Cables, Transmission Impairments, Electromagnetic Spectrum, Communication, Radio waves, Microwaves, Satellites, GSM, CDMA. 10 HOURS

Unit II Data Transmission and Media access Concepts

Data Link layer, Design issues, Frame, Error detection and correction, Flow Control, Elementary Data link protocols, Character-oriented and Bit-oriented Protocols, Sliding window protocols.

Channel allocation methods, TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision free protocols, IEEE standard 802 for LANS, Ethernet, Token Bus, Token ring. 10 HOURS

Unit III Network Establishment Concepts

Network Layer, Store and Forward Packet Switching, Connectionless and Connection-oriented services, Virtual Circuit, Routing Algorithms, Shortest path, Flooding, Link State, Distant vector, Hierarchical, Broadcast and Multicast Routing. OSPF, BGP, Congestion, Congestion control algorithms. 10 HOURS

Unit IV Internet Protocols

TCP/TP Protocol, IP Addresses, Classes of IP Addresses, Subnets, IPv6, Network layer in the Internet, Internet Control Protocols, ARP, RARP, BOOTP, DHCP, Transport Layer, Protocol Stack, TCP and UDP, Transport Services Primitives, Sockets, Socket Programming concept. 10 HOURS

Unit V Network Application

Application layer, Name service (DNS) Domain Hierarchy, Name servers, Name resolutions, Traditional applications, Telnet, FTP, SMTP, MIME, World wide web-HTTP, HTTP Methods.

Network security-Cryptographic Algorithms, DES, AES, RSA, Key exchange methods, Authentication protocols, Digital Signature, Firewalls 10 HOURS

SUGGESTED READINGS:

1. Andrew S.Tanenbaum, "Computer Networks", 5 e, 2003, Pearson Education Asia.
2. Behrouz A. Forouzan, "Data Communications and Networking", 4e, 2004,Tata McGraw Hills.
3. William Stallings. "Data and Computer Communication", 7e, 2003, Pearson Education Asia.
4. Prakash C. Gupta, Data Communications and Computer Networks, PHI
5. Michael A. Miller, "Data and Network Communications", 2e, Delmar Thomson Learning.
6. James F. Kurose and Keith W. Ross, "Compter Networking", 3e, Pearson Education.
7. William A. Shay, Understanding Data Communications and Networks, 2e, Thomson Asia Pvt. Ltd.
8. Peter Norton and Dave Kearns, "Complete Guide to Networking", ie,Techmedia India Ltd.
9. Douglas E. Comer, Internenetworking with TCP/IP Vol I & II, 3e, PHI

MCA - THIRD SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80
Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA-309
TITLE**:** SOFTWARE PROJECT MANAGEMENT

UNIT I INTRODUCTION

INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT AND PROJECT PLANNING: Concept of Software Project Management and its importance, Activities of Software Project Management, role of Project Manager, ways of categorizing software projects, project as a system, System Development Life Cycle, Problems encountered with software projects. Requirement Specification. Project selection, Project management plans, Selection of most appropriate plan. 9 HOURS

UNIT II PROJECT EVALUATION AND SELECTION

Evaluation of individual projects: Technical assessment, cost-benefit analysis (Evaluation Techniques),

and Risk evaluation.

Choosing technologies for the project; Technical plan, Software Process Models: waterfall, Spiral, Prototype, incremental, V- Model. 9 HOURS

UNIT III SOFTWARE PROJECT ESTIMATION AND SCHEDULING

Introduction to Project cost estimation, software cost estimation techniques, different types of project metrics, Models for cost estimation (COCOMO, Putnam's, statistical, function point), Project Portfolio Management, Earned Value Management.
Introduction to project scheduling, project schedules, project and activities, scheduling activities, Schedule development methods (Gantt Charts, Critical Path Method, Critical Chain Scheduling, PERT)
9 HOURS

UNIT IV OVERVIEW OF PROJECT MANAGEMENT

Introduction to management, Characteristics of management, Process of management, Levels of management, Impact of management. Human Resource Management, Motivation Theory, Formation and management of Project Team, Communication Planning, Formal and Informal Methods for distributing Information, Selecting appropriate communication medium, Understanding group and individual communication needs. 9 HOURS

UNIT V SOFTWARE QUALITY

Introduction, Importance, Quality Planning, Quality Assurance, Quality Control, Tools and Techniques of Quality Control, Pareto analysis, Stastistical Sampling, Six Sigma, Cost of Quality, McCal's Quality Model, Boehm's Quality Model, Dromey's Quality Model, CMM, ISO,
9 HOURS

SUGGESTED READINGS:

1. Bob Hughes & Mike Cotterell : Software Project Management, Tata McGraw Hill
2. S.A. Kelkar : Software Project Management, PHI
3. Roger S. Pressmen : Software Engineering, Tata McGraw Hill
4. Kathy & Schwalbe : Information Technology Project Mgt., Thomson Learning
5. Harvey Maylor : Project Management, Pearson Education

MCA - THIRD SEMESTER

Duration of the Examination: 3 Hrs — Theory Exams. = 80
Total Marks = 100 — Int. Assessment = 20

COURSE NO: MCA-310
TITLE**:** ALGORITHM DESIGN & ANALYSIS

UNIT –I Review of Algorithms and Data Structures

Algorithms, Problems and Instances, Characteristics, Basic Instructions, Control Mechanisms and Control Structures, Elementary data structures: Stacks and Queues, Trees, Sets and Disjoint Set Union, Graphs. Understanding and Analyzing the Problem, Choice of Appropriate Data Structures and Design Technology,

Analyzing an Algorithm 10 HOURS

Unit –II Basics of Analysis

Asymptotic Bounds, Concept of Efficiency of an Algorithm, Well Known Asymptotic Functions & Notations; Well Known Sorting Algorithms, Comparison of Sorting Algorithms, Best-Case and Worst-Case Analyses, Average-Case Analysis, Amortized Analysis.

10 HOURS

Unit – III Design Techniques-I

Divide-and-Conquer, General Method, Multiplication of two n-bit numbers, Binary Search, Merge Sort, Quick Sort, Strassen's Matrix multiplication, Exponentiation.
Dynamic Programming, General Method, The Problem of Making Change, The Principle of Optimality, Chained Matrix Multiplication.

10 HOURS

UNIT – IV Design Techniques - II

Backtracking, General method, n-queen's problem, Sum of subsets problem

Greedy Algorithms, General Method, Knapsack problem, Job sequencing with dead lines, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Single Source Shortest Path Algorithm.

10 HOURS

UNIT – V Classification of Problems & Graphs Algorithms

Non-Deterministic Algorithms, Introduction to NP-Completeness, Establishing NP-Completeness of Problems, NP-Completeness Proofs, NP-Hard Problems
Graphs Algorithms, Traversing Trees, Depth-First Search, Breadth-First Search, Best-First Search & Minimax Principle, Topological Sort.

10 HOURS

SUGGESTED READINGS:

1. Ellis Horowitz, Sartaj Sahni & S. Rajasekaran – Fundamentals of Computer Algorithms- second addition, University Press.
2. Aho A V , Hopcroft J E, Ullman J D – The Design and Analysis of Computer Algorithms, Addison Wesley.
3. G. Brassared and P. Brately - Fundamental of Algorithmics, Prentice Hall of India
4. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, "Introduction to Algorithms", , 2nd Edition, Prentice Hall of India
5. D. E. Knuth. Fundamental Algorithms (The Art of Computer Programming: Volume 1). Second Edition, Narosa Publishing House, New Delhi.
6. A. V. Aho, J. E. Hopcroft, and J. D. Ullman. Data Structures and Algorithms. Addison-Wesley.

MCA - THIRD SEMESTER

Duration of the Examination: 3 Hrs
Total Marks = 100
COURSE NO: MCA-311
TITLE: COMPUTER GRAPHICS

Theory Exam. = 80
Int. Assessment = 20

UNIT I Introduction to Computer Graphics

Concept of Computer Graphics and its applications; Graphics input and output devices. Video display devices: Refreshing display devices, Random scan display device, Raster scan devices, Flat Panel Devices, color CRT, Direct View Storages Devices. Input Devices, Hard Copy Devices

10 HOURS

UNIT II Graphic Primitives

Concept of Graphic Primitives, points, lines etc., line generation algorithms (DDA and Bresemham's)
Circle and its properties, generation of circle (mid point algorithms); Polygon filling, using scan line filing algorithm; Aliasing, half toning, Sampling, Filtering Techniques

10 HOURS

UNIT III Geometric Transformations:

Concept of 2D transformations; Basic Transformations :Translation, Rotation, Scaling; other transformations: Reflection, Shear; Composite transformations, transformations using homogeneous coordinate systems.
3D transformations (Translation, rotation, scaling, shearing, reflection)

10 HOURS

UNIT-IV. Viewing & Clipping Transformations

Introduction; objectives of viewing transformation; Concept of projections: parallel projection, orthographic and oblique projections, isometric projections, perspective projections (concept of vanishing points, single point, perspective transformation, 2-point and 3-point perspective transformation and general perspective transformation with COP at the origin.

Clipping Operations: Point and Line clipping, Cohen- Sutherland and Cyrus – Beck Line Clipping algorithms

10 HOURS

UNIT-V.:Three-Dimensional Object Representation

Polygon surfaces, polygon tables, plain equation, polygon meshes, Bezier curves &Surfaces, properties of Bezier curves, Hermite Interpolation.

Hidden line/surface Removal: back face removal, Z-buffer, Painter's Algorithms, scan line, area sub division method

SUGGESTED READINGS:

1. Giloi, Wk.: Interactive Computer Graphics, Prentice-Hall, 1978.
2. Newman, W., Sproul, R.F.: Principles of Interactive Computer Graphics, McGraw-Hill, 1980.
3. Rogers, D.F.: Procedural Elements for Computer Graphics, McGraw-Hill, 1985.
4. Harrington, S.: Computer Graphics: A Programming Approach, TataMcGraw- Hill, 1983.
5. Foley, J.D., Van Dam, A.: Fundamentals of Interactive Computer Graphics, Addison Wesley, 1982.
6. Hearn, D., Baker, and P.M.: Computer Graphics, Prentice-Hall, 1986.
7. Tosijasu, L.K.: Computer Graphics, Springer Verlog, 1983.
8. Rogers, D.F. McGraw Hill: Mathematical Elements of Computer Graphics.
9. A.P Godse: computer Graphics/Technical publications Pune

MCA - THIRD SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80
Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA-312

TITLE: APPLICATION PROGRAMMING USING JAVA

UNIT –I Java Language Basics

Features, Object Oriented concepts, Java Virtual Machine Concepts, Primitive Data Type And Variables, Java Keywords, Java Operators, Expressions, Control Statements and Arrays.
Class and Objects, Static methods, Constructors, Method Overloading

10 HOURS

UNIT –II Inheritance, Packages and Interfaces

Inheritance, Access Control, Method Overriding, Garbage Collection, Abstract Classes, Polymorphism
Packages, Interfaces, Exceptions Handling, Types of Exceptions, Writing Exception Subclasses, Multithreading, Synchronization in Java

10 HOURS

UNIT –III I/O, Files & Applets Programming

I/O in Java, Byte Stream Classes, Character Stream Classes, Reading and Writing to Console, Reading and Writing Files, The Transient and Volatile Modifiers, The String and String Buffer Class.
The Applet Class, An Applet Skeleton, Adding images & sound, Passing parameters to an applet.

10 HOURS

UNIT –IV AWT & Networking

AWT Components, Building User Interface with AWT, Handling Events, Event Delegation Model (Events, Listeners, interfaces, Anonymous Classes). Layouts and Layout Manager, Introduction to Swing Components

Networking: InetAddress class, URL class, TCP sockets, UDP sockets.

10 HOURS

UNIT – V Database Connectivity

JDBC Overview, JDBC implementation, Connection class, Statements, Types of statement objects (Statement, PreparedStatement and CallableStatement), Types of resultset, ResultSetMetadata, Catching Database Results, Handling database Queries, JDBC and AWT.

10 HOURS

SUGGESTED READINGS:

1) Herbert Schildt – "Java2 The Complete Reference" , Tata Mcgraw Hill.
2) K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000.
3) E. Balagurusamy - " Programming with JAVA", Tata McGraw Hill.
4) Dietel & Dietel – "Java How to Program" , Pearson Education.
5) Steven Holzner – "Java2 Black Book" , Dreamtech Press.
6) George Reese - Database Programming with JDBC and Java, 2nd Edition, O'Reilly.
7) Bruce Eckel – "Thinking in Java", Prentice Hall.

MCA - THIRD SEMESTER

COURSE NO: MCA-390
PRACTICALS

Practicals will be based on following Papers:

1. Computer Networks (MCA-308)
2. Software Project Management (MCA-309)
3. Algorithm design & Analysis(MCA-310)
4. Computer Graphics (MCA-311)
5. Application Programming using Java (MCA-312)

MCA - FOURTH SEMESTER

Duration of the Examination: 3 Hrs
Total Marks = 100
Theory Exam. = 80
Int. Assessment = 20
COURSE NO: MCA-411
TITLE: WEB TECHNOLOGIES

UNIT-I HTML

Text Formatting Tags, META Tag, Adding Lists, Table, Embedding objects, Paragraphs, Formatting, Links, Head, Images, Tables, Lists, Blocks, Layout, Forms, Colors, Color values, Frame and Form, Form Controls, CSS, Defining Styles, Elements of Style, Linking a Style Sheet to an HTML Document, In-line Styles, External Style Sheets, Internal Style Sheets, XML, structure of XML document, using DTD with XML, XML Entities, XML schema

10 HOURS

UNIT II JavaScript

Variables, String manipulation, Mathematical Functions, Statements, Operators, Arrays, and Functions, Data and Objects, Regular Expressions, Built-in Objects, Events, Opening a New Window, Messages and Confirmations, The Status Bar, Writing to a Different Frame, Rollover, Buttons, Moving Images

10 HOURS

UNIT III Servlets

Servlet Life Cycle, Servlet Request and Response Disadvantages of Servlets, Reading Headers
JSP: Scripting Elements, JSP Expression, JSP Declaration, Predefined variables/objects, using user defined functions, working with Databases Using JSP, Inserting, Updating, and Deleting Database Records.

10 HOURS

UNIT IV ASP.NET

Installing Internet Information Server, IIS Manager, Creating Virtual/Home Directory, Folder Settings, Adding a virtual directory to your neighborhood, Installing .NET Framework SDK.
Server pages: Creating Server pages, page Life Cycle, HTTP Request Object, HTTP Response Object, Postback, Tracing & Debugging ASP.NET page.
State Management and Types of State Management, HTTP Cookies, HTTP Session, HTTP Application, Query String Method, State Management using Postback URL, View State.

10 HOURS

UNIT V Server Control

Standard Control, Validation Control, Data Bind Control and Types of Data Bind Control, Repeater, Data List, Grid View, Form View, Detail View.
Navigation Control and Login Control, Site Map, Tree View, Menu Control, Creating Master Pages

10 HOURS

SUGGESTED READINGS:

1. Web Programming – Chris bates – Wiley Dreamtech India
2. Multimedia and Web Technology, Ramesh Bangia, 2e, Firewall Media
3. Internet and Worldwide Web, H.M. Deitel, P.J. Dietel and A.B. Goldberg, 3e, Pearson Education
4. Mastering Javascript and Jscript, James Jaworski, 2e, BPB
5. HTML 4.0, E. Stephen Mack and Janan Platt, 1e, BPB
6. JSP The complete Reference, Phil Hana
7. Java Servlets and JSP, Bonce W. Perry,
8. Dynamic HTML, Jeff Rule, 1e, Dreamtech Press
9. Java Server pages in 24 Hours, Jose Annunziato and Stephanie Fesler Kaminaris 1e, Techmedia
10. Web Warrier Guide to Web Design Technologies Sklar – Thomson Learning
11. Principals of Web Design – Sklar Thomson Learning
12. JAVA Script Interactive Course, Arman Danesh, Techmedia
13. Web Technologies, Uttam.K.Roy, Oxford higher Education
14. ASP.NET and VB.NET Web Programming, Matt J. Crouch, Pearson Education
15. Sams Teach Yourself ASP.NET 4 in 24 Hours: Complete Starter Kit, Scott Mitchell, Pearson Education

MCA - FOURTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 420

TITLE: THEORY OF COMPUTATION

UNIT – I Regular Expressions and Languages:

Sets, Relations and Functions, Strings, alphabets and languages, Regular expressions, Algebra of Regular expressions, Regular grammar, Regular languages, Closure properties of Regular languages, Finite automata, Mealy and Moore Machines. Applications of regular expressions

10 HOURS

UNIT – II Finite Automata

Non-Deterministic and Deterministic Finite Automata, Equivalence of Regular Expression and Finite automata, Equivalence of ^-NFA and NFA, Equivalence of NFA and DFA, Pumping Lemma for Regular Languages, Applications of finite automata.

10 HOURS

UNIT – III Context Free Grammar

Grammar and its classification, Production rules and derivation, Context free Languages, Closure properties for context free languages, Pushdown Automata, Backus-Naur Form, Chomsky Normal Form, Griebach Normal Form, Pumping Lemma for Context free languages, Applications of Context Free Grammar.

10 HOURS

UNIT – IV Turing Machines

Description, Transition diagram, Roles of Turing machine, Church-Turing Thesis, Modular Construction of complex Turing machines, Extensions of Turing machines, Non-Deterministic Turing Machines. Universal Turing Machine, Turing acceptable and Turing decidable languages

10 HOURS

UNIT – V Function Theory

Recursive Function Theory and Unsolvable Problems Partial, total and constant functions, Primitive recursive functions; Unbounded minimalisation and μ-recursion;

Decidable and Undecidable Problems, The Halting Problem, Reduction to Another Undecidable Problem, Undecidability of Post Correspondence Problem.

10 HOURS

SUGGESTED READINGS:

1. H. R. Lewis and C. H. Papadimitriou - Elements of the Theory of Computation, Prentice Hall of India.
2. J. E. Hopcroft, R. Motwani and J. D Ullman - Introduction to Automata Theory, Languages and Computation, Pearson Education Asia.
3. Michael Sipser, Introduction to the Theory of Computation, Second Edition, Thomson, 2006.
4. Jeffrey Shallit, A Second Course in Formal Languages and Automata Theory , Cambridge University Press, 2008.
5. K. L. P. Mishra and N. Chandrasekaran - "Theory of Computations (Automata, languages and Computation)", Prentice Hall.
6. Rogers H., Theory of Recursive Functions and effective computing, Mcgraw-Hill
7. J.C.Martin–Introduction to Languages and Theory of Computation, Tata Mcgraw Hill.

MCA - FOURTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 421

TITLE: DATA MINING & DATA WAREHOUSING

UNIT – I Database Introduction

Database Introduction: Database Management System Concepts and Architecture, Normalization, RDBMS, Concurrency control.

10 HOURS

Unit – II Data Warehouse and OLAP Technology for Data Mining

Data Warehouse and OLAP Technology for Data Mining: Introduction to Data Warehouses, Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Three-tier Data Warehouse Architecture, Steps for the design and construction of Data Warehouses, Conceptual Data Architecture, Logical Architectures, Design Techniques. Data Warehouse Implementation, Data Marts, Metadata, OLAP, Categorization of OLAP Tools.

10 HOURS

UNIT – III Data Preprocessing

Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Mining Primitives, Concept Description, Mining Association Rules and Algorithms.

8 HOURS

UNIT – IV Data Mining Methods

Data Mining Methods –Correlation Analysis, Classification and Prediction - Basic Concepts, Statistical based classification, Decision Tree Induction, K Nearest Neighbors, – Rule Based Classification – Classification by Backpropagation – Support Vector Machines 8 HOURS

UNIT – V Clustering and Introduction to Fuzzy Logic

Clustering and Introduction to Fuzzy Logic: Cluster Analysis, Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Outlier Analysis, Data Mining Applications.

Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions. Basic operations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations. Propositional logic and Predicate logic

10 HOURS

SUGGESTED READINGS:

1. Elmasri, Navathe: Fundamentals of Database Systems, Addison Wesley, Pearson Education.
2. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition.
3. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier.
4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education.
5. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India.
6. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India.
7. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience.

MCA- FOURTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80
Total Marks = 100 | Int. Assessment = 20
COURSE NO: MCA – 422

TITLE: NUMERICAL AND STATISTICAL COMPUTING

UNIT – I Solutions of Equations

Iterative Methods: Zeros of a single transcendental equation; Newton - Raphson Methods, Convergence of solution; Polynomial Evaluation; Birge vieta Methods and Bairstow's Methods; Solutions of Simultaneous Linear equations – Gauss elimination method and pivoting, Ill conditioned equations and refinement of solutions; Gauss – Seidal interactive Method

10 HOURS

UNIT II Numerical differentiation and Integration

Numerical differentiation and Integration, Solutions of Differential Equations; Modified Euler's Method, Runga - Kuta method; Automatic error monitoring, stability of solutions,
Newton's cotes of Integration
Interpolations: Polynomial interpolation Newton, Lagranges and Spline Interpolation

10 HOURS

UNIT III Basics of Statistics and Probability

Basic Statistics: Measures of central tendencies:- Mean, Median, Mode; Measures of dispersion: Range variance and standard deviation; Frequency distribution and cumulative frequency distributions; Linear correlation coefficient; Linear regression; Non-linear regression
Discrete Probability Distributions: Binomial (Derivation, mean and variance and fitting of Binomial distribution), Poisson (Poisson as a limiting case of Binomial distribution, mean and variance and fitting of Poisson distribution.
Standard variables and normal distribution, mean and variance of normal distribution, computing normal probabilities; fitting of normal distribution in a given set of data. Student's T test and F-Static test.

10 HOURS

UNIT IV Sampling Theory

Concept of Population, Sample; Importance of Sampling and its advantages, Sampling distributions, mean and standard deviation of the sampling distribution of means. Sampling distribution as a probability distribution, Sampling distribution of percentages, mean and standard deviation of Sampling distribution of percentages

10 HOURS

UNIT V Statistical Decision Making

Statistical decisions, hypothesis testing, type-1 and type-2 errors, level of significance, one tailed and two tailed tests.
Two sample hypothesis tests: Sampling distribution of the differences between sample means, two tailed and one tailed tests,sample hypothesis tests of percentages.
Comparison sample means (analysis of variance, A NOVA);
Chi-square analysis: Chi-square distribution, Chi-square testing, Computation of expected frequencies, testing of goodness of fit.

10 HOURS

SUGGESTED READINGS:

1. Stoer, Bullrich: Computer Oriented Numerical Methods, Springer Verlag, 1980.
2. Krishnamurthy, E.V., Sen, S.K.: Computer Based Numerical Algorithm, East West Press, 1984.
3. Rajaraman, V.: Computer Oriented Numerical Methods, Prentice Hall India, 1980.
4. S.S. Sastry: Introductory Methods of Numerical Analysis.
5. AFFI, A.A.: Statistcal Analysis: A Computer Oriented Approach, Academic Press, Inc. 1979.
6. MORRIS, C., ROLPH, J.: Introduction to Data Analysis and Statistical Inference,Prentice-Hall, 1981.
7. SCALZO, F.: Elementary Computer Assited Statistics, Van Nostrand Reinherd Co. Ltd., 1978.
8. JOHNSTON, J.: Econometric Methods, McGraw-Hill.
9. HOGG, R.V., CRAIG, A.L.: Introduction to Mathematical Statistics, American PublishingCo. Pvt. Ltd.
10. YULE, U.G., KENDALL, M.G.: An Introduction to the Theory of Statistics, CharlesGriffinand Co. Ltd.
11. DRAPER, N.A., SMITH, H.: Applied Regresion Analysis John-Wiley and Sons, Inc.
12. ANDERSON, T.W.: An Introduction to Multivariate Statistical Analysis, John-WileyandSons, Inc.
13. MORRISON, D.F.: Multivariate Statistical Methods, McGraw-Hill.

MCA - FOURTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80
Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 416(ELECTIVE-I)
TITLE: SIMULATION AND MODELLING

UNIT-I **Introduction**

System and system environment, components of system, discrete and continuous System, static and dynamic systems, model of a system, steps required in deriving a model of a system. Verification and validation of simulation model, stochastic nature of the output data
Introduction to the simulation, why and when simulation is an appropriate tool, advantages and disadvantages of Simulation, Areas of application, general steps followed in simulation experiment.

10 HOURS

UNIT-II **System Simulation**

Simulation of continuous system, description of continuous model using differential equations, chemical reactor system, integration vs. simulation, selection of integration formula, other examples of continuous system simulation, water reservoir system.
Discrete system simulation, fixed time step vs. next event models, use of random numbers; test of randomness, generation of non uniform random numbers, generation of random numbers of exponential and normal distribution, Monte-Carlo vs. stochastic simulation.

10 HOURS

UNIT-III **Simulation of queuing system**

Simulation of queuing system, elements of queuing theory, Poisson arrival pattern, negative exponential service time, simulation of single server queue, two severs queue and more general queues

10 HOURS

UNIT-IV **PERT**

Simulation of *PERT*, network model of project, critical path computation, uncertainties in the activity durations, normal PERT calculations, simulation of activity network, comparison of normal PERT calculation and calculation through simulations.

10 HOURS

UNIT-V **Inventory system**

Simulation of inventory system, elements of inventory theory, more complex inventory models, examples of simulation of inventory system: with respect to *service level* considerations and *minimum cost* considerations, generation of *Erlang* distributed variates.

Simulation languages, continuous and discrete simulation languages, features of some popular simulation languages: SIMSCRIPT, GPSS, SIMULA etc. Factors in selection of simulation language

10 HOURS

SUGGESTED READINGS:

1. Gorden, G. : System Simulation, Prentice Hall, 1978
2. Payer T. A. : Introduction to Simulation, McGraw-Hill, 1982
3. Reitman, J. : Computer Simulation Application, Wiley, 1971
4. Spriet, W.A. : Computer-aided Modeling and Simulation, Academic Press, 1982
5. Barnes, B. : Modelling and Performance measurement of Computer Systems, 1982
6. Deo, N. : Systems Simulation with Digital Computer, Prentice Hall, New Delhi, 1979
7. Banks J., Carson II J.S., Nelson B.L. : Discrete-Event system Simulation, Prentice Hall, New Delhi, 1996

MCA - FOURTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 417(ELECTIVE-I)
TITLE: VB.Net & Windows Programming

UNIT-I Windows Programming Fundamentals

Basic concepts, structure, C Conventions, window API, typedef integer types, Boolean types, Pointers in the 32-bit, Windows Programming Model, Event Driven Model, Window messages, message looping, Window Handles, Creation and Displaying of Window, Interaction with Window.

10 HOURS

UNIT-II Introduction to VB.NET

Features, VB.NET Development Environment, Creating VB.NET applications, Introduction to forms, data types, variables, type conversion, constants, operators and expressions; Conditional Statements and Loops, Procedures, Argument passing mechanism, Arrays, Error Handling

10 HOURS

UNIT-III OOP & Window Applications

Classes and objects, Properties, methods and events, Inheritance, Access modifiers, Interfaces, Polymorphism;
Window Applications, Window Forms, Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons, List Boxes, Combo Boxes, Picture Boxes, Scrollbars, Timer, Menus, Built-in Dialogs etc.

UNIT-IV Database Connectivity

Connection Objects, Command Objects, Data Adapters, Datasets, Data Reader, connecting databases, Multiple Table Connection, Data binding, Data Grid View, Data Validation.

10 HOURS

UNIT-V: File handling & Crystal Reports

File handling using FileStream, StreamWriter, StreamReader, BinaryReader, BinaryWriter classes, File and Directory Classes.
Crystal Report, Connection to Database, Table, Queries, Building and Modifying Report, Working with formula fields, Parameter fields etc.

10 HOURS

SUGGESTED READINGS:

1) Johnson M. Hart , Windows System Programming - 4th Edition , Addison-Wesley, 2010, 0-321-65774-8

2) Francesco Balena, "Programming Microsoft Visual Basic.NET", Microsoft Press.

3) Steven Holzner et al., "Visual Basic 2005 Programming – Black Book", Dreamtech Press.

4) Steven Holzner, Bob Howell, "ADO.NET Programming in Visual Basic .NET", Prentice Hall.

5) Kevin Goff , Rod Paddock, "Pro VS 2005 Reporting using SQL Server and Crystal Reports", APress

6) Yashwant P. Kanitkar, "Let us C-5th Edition" , BPB publications.

7) George Peck, "The Complete Reference- Crystal Reports", Tata McGraw Hill

MCA - FOURTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 418(ELECTIVE-I)

TITLE: VLSI & EMBEDDED TECHNOLOGY

UNIT-I **Review of Digital Systems**

Boolean algebra: axioms, relation with set algebras. Combinational Boolean functions: truth tables, representation of Boolean functions as Boolean formulas, minimization of sum-of-product Boolean formulas, multi-level Boolean formulas, Shannon decomposition of a Boolean function. Logic gates, implementation of Boolean formulas using logic gates.

10 HOURS

UNIT-II **The Platforms and Simulators**

Introduction to Linux workstations, working with GCC development tools, Overview and working with GHDL VHDL simulator, Understanding FPGA synthesis tool set, models and features.

10 HOURS

UNIT-III **Sequential Systems and MOS transistor as an ideal switch**

Synchronous Sequential systems: synchronous finite state Mealy and Moore machines. Memory elements: level-triggered latches, edge-triggered, registers.

10 HOURS

UNIT-IV **Hardware description language (VHDL)**

VHDL – Overview, standards and applications, VHDL – Language, syntax – entities, architectures structural elements, data types, operators, sequential and concurrent statements, Sub-programs

10 HOURS

UNIT-V **Embedded Systems:**

Introduction, Embedded Processors: 8-bit accumulator processors, microcontrollers, Data processors, RISC processors, Digital signal processors, Real time operating systems-scheduling algorithms and memory models, buffering, software for embedded systems

10 HOURS

SUGGESTED READINGS:

1. D.L. Perry, VHDL programming by Example, McGraw Hill Education.
2. Steve Heath, Embedded Systems Design, Second edition, Elsevier.
3. C.H. Roth, Digital Systems Design using VHDL, PWS Publishing.
4. Douglas Perry, VHDL: Programming by Example, McGraw Hill Education.
5. Peter J. Ashenden, The Designers guide to VHDL, Morgan Kaufmann.
6. Stanley Major, Patricia Langstraat, A Guide to VHDL, Springer.
7. PIC16F84A data sheet.
8. Moris Mano , Digital Electronics and computer architecture

MCA - FOURTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 419(ELECTIVE-I)
TITLE: PROGRAMMING PARADIGMS

UNIT I **OBJECT-ORIENTED PROGRAMMING – FUNDAMENTALS**

Review of OOP, Objects and classes in Java, defining classes, methods, access specifiers, static members, constructors, finalize method, Arrays, Strings, Packages, JavaDoc comments

10 HOURS

UNIT II **OBJECT-ORIENTED PROGRAMMING – INHERITANCE**

Inheritance, class hierarchy, polymorphism, dynamic binding, final keyword, abstract classes, the Object class, Reflection, interfaces, object cloning, inner classes, proxies

10 HOURS

UNIT III **EVENT-DRIVEN PROGRAMMING**

Graphics programming, Frame, Components, working with 2D shapes, Using color, fonts, and images, Basics of event handling, event handlers, adapter classes, actions, mouse events, AWT event hierarchy, introduction to Swing, Model-View controller, design pattern, buttons, layout management, Swing Components

10 HOURS

UNIT IV **GENERIC PROGRAMMING**

Motivation for generic programming, generic classes, generic methods, and virtual machine , inheritance and generics, reflection and generics, exceptions, exception hierarchy, throwing and catching exceptions, Stack Trace Elements, assertions, logging

10 HOURS

UNIT V **CONCURRENT PROGRAMMING**

Multi-threaded programming, interrupting threads, thread states, thread properties, thread synchronization, thread-safe Collections, Executors, synchronizers, threads and event-driven programming

10 HOURS

SUGGESTED READINGS:

1. Cay S. Horstmann and Gary Cornell, "Core Java: Volume I – Fundamentals", Eighth Edition, Sun Microsystems Press, 2008.
2. K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000

3. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson tion, 2000.
4. C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, Tata McGraw-Hill Publishing company Ltd., 2006.

MCA-490: PRACTICALS:

The Practicals in this course shall be based on all above courses

1. Web Technologies(MCA-411)
2. Theory of Computation(MCA-420)
3. Data Mining & Data Warehousing(MCA-421)
4. Numerical & Statistical Computing(MCA-422)
5. Elective-I (any one of the following)

MCA-416	Simulation & Modelling
MCA-417	VB.Net & Windows Programming
MCA-418	VLSI & Embedded Technology
MCA- 419	Programming Paradigms

A mini project shall be assigned to students.

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA - 504

TITLE: ARTIFICIAL INTELLIGENCE

UNIT – I Introduction

Introduction to AI : History of AI, Basic Elements of AI, Introduction to Turing Machine, Introduction to Expert system, Expert System Life Cycle, Study of existing expert systems like MYCIN and DENDRAL.

10 HOURS

UNIT-II Knowledge Representation

Knowledge Representation Structures : Prepositional Logic, First Order Predicate Logic, CNF, DNF, Prenex Normal Form, Resolution, Unification, Inference Mechanisms Semantic Nets, Frames, Scripts, conceptual dependences, Procedural & Declarative knowledge , Reasoning, Uncertainity.

10 HOURS

UNIT - III Machine Learning

Machine Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning, Machine Learning Algorithms : Naive Bayes, Decesion Tree, KNN, ANN, Clustering Forward Backward chaining.

10 HOURS

UNIT - IV Understanding Natural Languages

Understanding Natural Languages: Parsing techniques, context free and transformational grammers, transition nets, augmented transition nets, Fillmore's grammar; grammar-free analysers, sentence generation

10 HOURS

UNIT – V Introduction to PROLOG

Introduction to PROLOG : Operators, Data Structures, Input & Output, Controlling Program Flow, Strings, Recursion. 10 HOURS

SUGGESTED READINGS:

1. Charniak, E.: Introduction of Artificial Intelligence, Narosa Publishing House.
2. Kevin Knight, Elaine Rich, B. Nair : ARTIFICIAL INTELLIGENCE , Mc Graw Hill Education
3. George F. Luger, Artificial Intelligence, Pearson Education
4. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI.
5. Marcellus: Expert System Programming in TURBO PROLOG, Prentice-Hall-Inc.
6. Clark, K.L. & McCabe, F.G.: Micro-prolog, Prentice-Hall, India.
7. Clockskin, W.F. and Mellish, C.S.: Programming in Prolog

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA - 510

TITLE: OPTIMIZATION TECHNIQUES

UNIT-I Linear Programming

Linear Programming: Introduction, characteristics & assumptions; Mathematical model; graphical solution, simplex method, Dual simplex method, Applications, Sensitivity analysis.

10 HOURS

UNIT-II Integer programming

Introduction to integer programming, Branch and Bound techniques

Special types of linear programming problems – transportation problem formulation & solution; assignment problem formulation & solution; Traveling salesman problem, Applications

10 HOURS

UNIT-III Dynamic programming

Introduction to Dynamic programming, characteristics of Dynamic programming, Deterministic and probabilistic Dynamic programming, Network Analysis, Shortest Route problem, Applications

10 HOURS

UNIT-IV Project Scheduling

Diagram representation, critical path calculation, time chart, resource leveling, cost consideration in project scheduling, project control, Applications.

10 HOURS

UNIT-V Sequencing and Replacement models

Sequencing models and its applications, Solution of Sequencing problem, processing n jobs through 2 machines, processing n jobs through 3 machines, Processing 2 jobs through m machines, Processing n jobs through m machines

Replacement models and its applications, replacement of items that deteriorate with time (without change in money value), replacement of items that deteriorate with time (with change in money value), Staff replacement problem

10 HOURS

SUGGESTED READINGS:

1. TAHA, H.A.: Operations Research Macmillan, New York (1987).
2. Gillet, B.E.: Introduction to Operations Research-a Computer Oriented Algorithmic-Approach. McGraw Hill (1976)
3. Churchman, C.W. & Arnchoff E.L.: Introduction to Operations Research John Wiley and sons.
4. Srinath, L.S.: Linear Programming, East-West, New Delhi.
5. Operations Research, theory & Applications, JK Sharma, Macmillan publishers
6. Operations Research, V. K. Kapoor, Sultan Chand & Co.

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 511

TITLE: PRINCIPELS OF COMPILER DESIGN

UNIT-I Compiler Structure & Lexical Analysis

Compiler Structure: Compilers and Translators, Analysis- Synthesis Model of Compilation, Various Phases of Compiler, Pass Structure, Bootstrapping & Compiler Construction Tools.

Lexical Analysis: Interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, Error Reporting, Regular definition, Transition diagrams, LEX.
Capabilities of Lexical Analyzer

10 HOURS

UNIT-II Finite Automata

Finite Automata: Nondeterministic Finite Automata, Deterministic Finite Automata, Subset Construction, Thompson's construction, DFA State Minimization.
The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG.

10 HOURS

UNIT-III Parsing

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Nonrecursive Predictive Parsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers. YACC, Syntax Directed Definitions, Type checking

10 HOURS

UNIT-IV Memory Management & Intermediate Code Generation

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management

Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.
Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples.

10 HOURS

UNIT-V Code Optimization & Generation

Sources of optimization, Local optimization, Loop optimization, Peephole optimization
Issues in the design of Code Generator, Basic Blocks and Flow Graphs, Transformations on Basic Blocks, DAG, Code Generation Algorithm, Register Allocation and Assignment 10 HOURS

SUGGESTED READINGS:

1. Alfred V Aho , Jeffrey D. Ullman: "Principles of Compiler Design", Narosa Publ. House.
2. A.V. Aho, R. Sethi and J.D Ullman: "Compiler: principle, Techniques and Tools", Addison Wesley.
3. Tremblay and Sorenson: "The theory and Practice of Compiler Writing" – McGraw Hill.
4. Tremblay and Sorenson: "An Implementation Guide to Complier Writing" – McGraw Hill.
5. Londan: "Compiler Construction" - Thomson Learning
6. H.C. Holub: "Compiler Design in C", Prentice Hall.
7. Apple: "Modern Computer Implementation in C: Basic Design", Cambridge press
8 Compiler Construction: Principles & Practice: Londa – Thomson Learning

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Examination = 80

Total Marks = 100 | Internal Assessment = 20

COURSE NO: MCA-518
COURSE TITLE: .NET Technology & C#

UNIT-I **NET Framework & C#**

The .NET Framework: Introduction, Benefits, Components; C# program structure, Creating console application.
C# Language: Introduction, data types, value types, reference types, identifiers, variables, constants, literals.

10 HOURS

UNIT-II **C# Fundamentals**

C# operators, expressions, control structures, methods, Arrays, Strings, Structures, Enumerations. Classes and Objects, class and method modifiers;

10 HOURS

UNIT-III **Object Oriented Concepts**

Inheritance, Polymorphism and Interfaces, Managing Console I/O operations, Properties and Indexers, delegates and Events;

10 HOURS

UNIT-IV **Assemblies, Exceptions and Multithreading**

Namespaces, assemblies, Microsoft Intermediate Language (MSIL), Metadata, Attributes, Reflection, Exceptions, Multithreading

10 HOURS

UNIT-V **Windows Application**

Building windows Application, working with C# controls, Event Handling, Graphics Device Interface (GDI).

10 HOURS

SUGGESTED READINGS:

1. E Balagurusamy, "Programming in C#", 3rd edition, Tata McGraw Hill, 2010.
2. Mark Michaelis, "Essential C# 4.0", 3rd edition, Pearson Education.
3. Ivor Horton, "Beginning Visual C++ 2008", wrox, 2008.
4. Herbert Schildt, "C# 4.0 - The Complete Reference", McGraw Hill Education, 2010.
5. Joseph Albahari & Ben Albahari, "C# 5.0 in a Nutshell", O'Reilly, 2012.

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs Theory Exam. = 80

Total Marks = 100 Int. Assessment = 20

COURSE NO: MCA – 514(ELECTIVE-II)
TITLE: PARALLEL AND DISTRIBUTED PROCESSING:

UNIT-I Introduction

Introduction to Parallel Processing; Parallelism in sequential Mechanics; Abstract model, Multiprocessor architecture, Architecture classifications and Techniques. Pipelining, Arithmetic and Instruction Pipelines, Pipelining Hazard

10 HOURS

UNIT-II Parallel Processing Algorithms

Interconnection Networks, Hyper cubes, Shuffle Exchanges, Trees, Meshes and Butterfly networks, parallel Algorithm for, linear Algebra, Matrix Multiplication, solving linear systems, probabilistic algorithm, possibility of super linear speedup, Sorting, Vector and Array Processors.

10 HOURS

UNIT-III Parallel Processing Models

Shared Memory Programming, general model of shared Memory Programming,
Thread management, attributed, Thread implementation Java Threads.
Parallel Processing – Operating Systems for parallel Processors, types, tools and languages
Parallel Programming Languages – FORTRAN 90 (Introduction)

10 HOURS

UNIT-IV Distributed Systems

Characterization of Distributed Systems – Introduction, Examples of Distributed Systems,
Resource sharing and the Web, Challenges
Message passing Model, programming model, PVM,
Remote procedure Call – parameter passing, Java Remote Method Invocation
Other parallelism paradigms – Data Flow Computing, Systolic Architecture

10 HOURS

UNIT-V Distributed Database Concepts

Distributed Data Base – objectives, issues, systems, database integrity, concurrency model, DDBMS structure
Distributed Operating System – need, types, goals, design issues
Inter process Communciation

10 HOURS

SUGGESTED READINGS:

1. Scientific Computing, An introduction with parallel computing: Gene Golub/James M.Ortega
2. Introduction to parallel processing: M Sasikumar, Dinesh S., P. Ravi Prakesh: PHI, 2002

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 515(ELECTIVE-II)
TITLE: IMAGE PROCESSING

UNIT I **Introduction**

Digital Image: Origin, types, need, representation, properties, uses.
Fundamental steps in image processing: image acquisition, storage, processing, communication, display.
Mathematical and physical background of Image.

10 HOURS

UNIT II **Digital Image Processing**

Data Structures for Image Analysis.
Image Pre-processing: Geometric transformations, local pre-processing
Sampling and Quantization: Uniform & Non Uniform Sampling and Quantization, relationship between pixels.

10 HOURS

UNIT III **Image Enhancement**

Enhancement by point processing: Histogram Processing, image subtraction, image Averaging
Spatial Filters: Smoothing Filters, sharpening filters,
Enhancement in frequency domain: low pass filtering, high pass filtering.

10 HOURS

UNIT IV **Object Recognition & Image Compression**

Object recognition: Knowledge Representation, Statistical Pattern Recognition, Neural Nets, Graph Matching, and Optimization Techniques.
Color Fundamentals, color models: RGB, CMY, HIS;
Image Compression: lossy and loss less compression 10 HOURS

UNIT V **Image Segmentation**

Point Detection, line detection, edge detection, edge linking and boundary detection
Image representation schemes, boundary descriptors, regional descriptors, textures, morphology
3D Vision and Motion Analysis: Introduction & Concept

10 HOURS

SUGGESTED READINGS:

1. A.K.Jain, 'Fundamentals of Digital Image Processing' , Prentice Hall.
2. Rafael C. Gonzalez , Richard E. Woods , 'Digital Image Processing', Pearson Education
3. M. Sonka,V. Hlavac, R. Boyle, 'Digital Image Processing and Computer Vision', CENGAGE Learning
4. Madhuri A. Joshi, 'Digital Image Processing an algorithmic Approach', PHI
5. B. Chanda & D, D. Majumder 'Digital Image Processing & Analysis ', PHI

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 516(ELECTIVE-II)

TITLE: MOBILE TECHNOLOGIES

UNIT-I Basic of mobile technology & smart client

Mobile Devices -Definition, m-commerce, m-business, component of wireless environment, wireless communication, mobile device classification, Wireless Network -WPANS, WLAN, WWANS (1 G, 2G, 2.5G, 3G)

Introduction to Mobile Communications and Computing, Mobile Computing, novel applications, limitations and architecture

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, security in MANETs.

10 HOURS

UNIT-II Cellular concept and its initial implementations

The cellular concept, Multiple access technologies for cellular systems, Cellular system operation and planning (General principles, System Architecture, Location updating and call setup), Handoff and power control

Initial implementations of the cellular concept: The AMPS system, TACS system, NMT system, NTT system, Concluding remarks.

10 HOURS

UNIT-III Digital cellular mobile systems

Introduction, GSM: The European TDMA digital cellular standard, GSM standardization and service aspects

GSM reference architecture and function partitioning, GSM radio aspects, Security aspects, GSM protocol model, Typical call flow sequences in GSM, Evolutionary directions for GSM

IS-136 : The North American TDMA digital cellular standard(D-AMPS), Background on North American digital cellular, Service aspects of D-AMPS(IS-136), Network reference, Radio aspects, Security aspects, Protocol model and typical flow sequences, Evolutionary directions

10 HOURS

UNIT-IV Mobile data communications

Introduction, Specialized packet and mobile radio networks, Circuit switched data services on cellular networks, circuit switched data on analog cellular networks, Circuit switched data on digital cellular networks, high speed Circuit switched data in GSM, Packet switched data services on cellular networks, Packet data in analog cellular networks, CDPD(cellular digital packet data), Packet data in digital cellular, Evolution of cellular mobile data capabilities : The EDGE concept, Data over lower power wireless or cordless telecommunication networks, Data services over DECT(Digital enhanced cordless telecommunications),Data services in PACS(Personal Access communications System), Data services in PHS(Personal Handy phone system), Data services in CT2(Cordless Telephony 2)

10 HOURS

UNIT-V Android Basic & Its components

Introduction to Android -History of android ,The Open Handset Alliance,Android SDK installation ,Android SDK & their codenames ,Advantages of android ,The Android O/S Architecture, Over view of IDE for Android application, AVD , launching and starting AVD (android virtual device) Managing Application Resources -What are resources, resource value types, storing different resource values types (string, string arrays, Boolean, colors, integer, animation, & menus)

Android Application Components- Activities & its life cycle , Services & its life cycle, Broadcast receiver, Content provider, Intents, shutting down component ,Android Manifest File in detail ,Use of Intent Filter

SUGGESTED READINGS :

1.Mobile and personal communication systems and services,By Raj Pandya

2. Mobile communications,By Jochen Schiller

3. Mobile Computing ,By Talukder Yavagal

4. Jochen Schiller,"Mobile Communications",Addison-Wesley. (Chapters 4,7,9,10,11),second edition, 2004.

5. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.

6. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", 7. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional,

2005.
8. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.
9. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003.
10. Android wireless application development ,second edition by shane conder ,Lauren darcey –Addison - Welsey
11. Android Application Development by Rick rogers,John Lombardo – O'Reilly
12. Professional Android 2 application development by Reto Meier –Wrox

MCA - FIFTH SEMESTER

Duration of the Examination: 3 Hrs | Theory Exam. = 80

Total Marks = 100 | Int. Assessment = 20

COURSE NO: MCA – 517(*ELECTIVE-II)*

TITLE: Neural Networks

UNIT I **Basics of Artificial Neural Networks**

Introduction to Biological Neural Networks, Artificial Neural Networks, characteristics of ANN, Historical Developments of Neural Networks, Neural Network Topologies, Threshold Logic Machines, Models of Neuron , Activation Functions

10 HOURS

UNIT II **Learning in Neural Networks**

Introduction to Activation Dynamics and Synaptic Dynamics, Training NN, Types of Learning, Learning laws, Stability and Convergence, Recall in Neural Networks

10 HOURS

UNIT III **Feed Forward Neural Netwoks**

Perceptron , Perceptron Learning Law, linear Separability and XOR problem , Convergence, Multilayer Feed Forward Networks, Backpropagation , Generalization, Recognition Tasks performed by feedforward nets: Pattern Classification ,Pattern Recognition , Pattern Association, Pattern Mapping.

10 HOURS

UNIT IV **Feedback Neural Networks**

Competitive Learning Neural Networks, Stochastic Networks, Simulated Annealing, Hopfield Network, Boltzmann Machine, Associative memory Tasks performed by Competitive Nets: Pattern Clustering, Pattern Storage

10 HOURS

UNIT V **Hybrid Neural Networks**

Counter Propagation, Radial Basis Function Nets, Adaptive Resonance Theory, Neocognitron, Stability-Plasticity Dillema, Application of ANN: Direct applications, Application areas

10 HOURS

SUGGESTED READINGS:

1. Haykins, "Neural Networks", 1e, 2003, Pearson Education Asia.
2. B. Yegnanarayana, "Artificial Neural Networks", PHI.
3. Jacek M. Zurada "Introduction to Artificial Menral Systmen" 4e, JAICO Publishing house.
2. Alexander, Heien Marton, "An Introduction to Neural Computing". Thomson
3. Anderson, "Introduction to Neural Networks", PHI.
4. Rajasekhara, "Neural Networks, Fuzzy Logic and General Algorithms", PHI.
5. Ananda Rao, Srinivas, "Neural Networks", 2003, Narosa.
6. Mohamad H. Hassoun, "Fundamental of Artificial Meural Network", 2e, PHI.

MCA-590: PRACTICALS

The Practicals in this course shall be based on all above courses

1. Artificial Intelligence (MCA-504)
2. Optimization Techniques(MCA-510)
3. Principles of Complier Design(MCA-511)
4. NET Technology & C# (MCA-518)

Elective II (any one of the following)

MCA-514	Parallel & Distributed Processing
MCA-515	Image Processing
MCA-516	Mobile Technologies
MCA-517	Neural Networks

MCA - SIXTH SEMESTER

COURSE NO: MCA-601 (Project work)

The scheme of evaluation regarding Project work shall be as follows:

The project in sixth semester shall carry 400 marks distributed as follows:

Project Component		**Marks**
Mid-Semester Presentation & Internal Evaluation		100
End-Semester Evaluation	Project Evaluation	200
	Project Viva-voce	100
Semester-VI Total: -		400

The student is required to take up project work of minimum four to six months duration. The student will submit a synopsis at the beginning of the semester for approval from the department. The student will have to present the progress of the work through Mid-Semester Presentation after two months duration. The date of Mid-Semester Presentation will be communicated by the department and will be displayed on the department notice board. All the students are required to keep in touch with the respective department. The evaluation of Mid-Semester presentation shall be internal, to be done at the departmental level.
End semester evaluation will be carried out by internal and external examiners. Each student shall carry out the project in the concerned Department/Other Institution/Organization as approved by the Department under the supervision of a teacher assigned by the Department.

In case a student has failed to submit his project report by the date fixed by the department or his work is found unsatisfactory, he may be asked to do more work in such manner as may be decided by the Head. The result of such students shall be announced separately by the university.