FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

MASTER IN COMPUTER APPLICATIONS
(Three Years Course)

(Under Credit Based Continuous Evaluation Grading System)

(Semester: I – VI)

Examination: 2013-14

GURU NANAK DEV UNIVERSITY
AMRITSAR

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER SYSTEM)
(Under Credit Based Continuous Evaluation Grading System)

Semester-I					
			Credits		
Sr. No.	***Sub Code***	***Subject***	**L**	**T**	**P**
1.	CSL410	Fundamentals of Computers	4	0	0
2.	CSL411	Introduction to Programming	4	0	0
3.	CSL412	Computer Oriented Numerical & Statistical Methods	4	0	0
4.	ECL491	Principle of Digital Electronics	4	0	0
5.	CSP410	Programming Laboratory-I	0	0	2
6.	MTL408	Mathematical Elements of Computer Science	4	0	0
		Sub Total:	**20**	**0**	**2**
		Grand Total:	**22**		

Semester-II					
1.	CSL420	Data & File Structures	4	0	0
2.	CSL421	Computer Organization & Architecture	4	0	0
3.	CSL422	Advances in Operating Systems	4	0	0
4.	CSP420	Programming Laboratory–II	0	0	2
5.	CBL496	Accounting & Financial Management	4	0	0
6.	MTL418	Computer Based Optimization Techniques	4	0	0
		Sub Total:	**20**	**0**	**2**
		Grand Total:	**22**		

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Semester-III					
1.	CSL510	Object Oriented Programming	4	0	0
2.	CSL511	Theory of Computation	4	0	0
3.	CSL512	Microprocessor & its Applications	4	0	0
4.	CSL513	Information System	4	0	0
5.	CSL514	Data Base Management Systems	4	0	0
6.	CSP510	Programming Laboratory-III	0	0	2
		Sub Total:	**20**	**0**	**2**
		Grand Total:	**22**		
Semester-IV					
1.	CSL520	Knowledge Based System	4	0	0
2.	CSL521	Computer Networks	4	0	0
3.	CSL522	Computer Graphics	4	0	0
4.	CSL523	System Simulation	4	0	0
5.		Interdisciplinary course-I	4	0	0
6.	CSP520	Programming Laboratory-IV	0	0	2
		Sub Total:	**20**	**0**	**2**
		Grand Total:	**22**		

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Semester-V					
1.	CSL611	System Software	4	0	0
2.	CSL612	Software Engineering	4	0	0
3.	CSP610	Programming Laboratory – V	0	0	2
4.		Elective -1	4	0	0
5.		Interdisciplinary course-II	4	0	0
6.		Interdisciplinary course-III	4	0	0
		Sub Total	**20**	**0**	**2**
		Grand Total	**22**		
		List of Electives-I			
1.	CSL614	Artificial Neural Networks	4	0	0
2.	CSL615	Image Processing	4	0	0
3.	CSL616	Performance & Evaluation of Computer Systems	4	0	0
4.	CSL617	Distributed Processing	4	0	0
5.	CSL618	Emerging Trends in Information Technology	4	0	0
Semester-VI					
1.	CSE620	**Major Project**	0	0	26
		Sub Total	0	0	26
		Grand Total	**0**	**0**	**26**

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – I)
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CSL410: FUNDAMENTALS OF COMPUTERS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction: Computer System Characteristics, Hardware - CPU, Memory, Input, Output & Storage devices, Organization of Secondary Storage Media**,** Software - System & Application, Types of processing Batch and On-line.

Operating System Concepts: Role of an Operating System, Types of operating systems, Booting procedure and its types, Fundamentals and typical instructions of Windows & Non-Windows based Operating Systems.

Development Tools: Editors, Translators - Compilers, Interpreters, Linkers Loaders, Debuggers, Programming Languages - Syntax & Semantics.

UNIT-II

Programming Tools: Problem Analysis, Program Constructs (Sequential, Decision, Loop), Algorithms, Flowcharts, Pseudocode. Decision table, Modular Programming, Top-down and Bottom-up Approaches.

Office Management Tools: Exposure to the operational knowledge of office management activities: Word processing using MS Word – Editing, Formatting, Spell Checking, Mail Merge and table handling, Spreadsheet - Excel – Editing, Formatting, Creating formulas, Charts.
Presentation Tool: MS PowerPoint – Templates, Views, Formatting text, Slides with graphs.
Database Management using MS-Access – Tables and Queries.

UNIT-III

Data Communications: Introduction to Data Communication, Network Architectures, Types of Networks, Transmission Media, Modems, ISDN

Internet: Internet and its applications, Working knowledge of Search engines and use of electronic mail, Virus, Threats, Hacking Prevention Mechanism: Anti – Viruses, Firewalls, Proxy Servers

References :

1. Computers Today: Suresh K. Basandra, Galgotia, 1998.
2. Gurvinder Singh & Rachhpal Singh: A Test Book on Windows Based Computer Courses, Kalyani Publishers, 1999.
3. Droomy, G: How to solve it by computer, Prentice Hall, 1985.
4. V.K. Jain: Fundamentals of Information Technology.
5. Norton, Peter: Introduction to Computers, McGraw Hill
6. Martin, James: Telecommunications and the Computer, PHI

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – I)
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CSL411: INTRODUCTION TO PROGRAMMING

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction to Program Development: Need for program Development Life Cycle (PDLC), description of different phases of PDLC viz. defining the problem, designing the program, coding the program, testing and debugging the program, formalizing the solution, and finally implementing & maintaining the program.
Overview of C: Brief history of C, comparison of C with other programming languages, general structure of a C program, stages in the development of a C program, introduction to different versions of C.
Data Types, Operators & Expressions: Constants and variables, data types, declaring variables, storage classes, different types of expressions and their evaluation, conditional expression, assignment statement, enumerated data type, redefining/creating data types, library functions, type casting.
Console Input/Output: Standard input/output devices, unformatted input/output functions (character I/O functions and string I/O functions), formatted input/output functions *(scanf( )* function and *printf ( )* function).

UNIT-II

Control Statements: Decision making using *if, if - else, elseif* and *switch* statements, Looping using *for*, *while* and *do - while* statements, transferring program control using *break* and *continue* statements, programming examples to illustrate the use of these control statements.
Pointers: What is pointer? Why pointers? Declaring pointers, accessing values via pointers, pointer arithmetic, types of pointers.
Functions: Defining a function, local variables, *return* statement, invoking a function, specifying and passing arguments to a functions, function prototyping and use of header files, pointer to a function, detailed discussion on recursion, command line arguments, building own library.
Program Structure: Program structure revisited, managing multi-file programs using traditional approach of separate compilations and project facility of Turbo C compiler, storage classes revisited.

UNIT-III

Arrays & Strings: Introduction to arrays, declaring arrays, initializing arrays, processing of arrays, pointers to arrays, passing arrays as arguments to a function, introduction to strings, pointers to strings, passing strings and arrays of strings as arguments to a function, programming examples to illustrate the use of arrays and strings. Discussion on arrays is to be limited up to 3-D arrays only.

Structures & Unions: Introduction to structures, declaring structures, initializing structures, accessing elements of structures, array of structures, nested structures, pointers to structures, self-referential structures, passing structures as arguments to a function, introduction to unions, programming examples to illustrate the use of structures.

Data Files: Introduction to data files, different ways of file processing (standard I/O & system I/O), description of various library functions for file handling, updating files, programming examples to illustrate the processing of files.

References:

1. R.S. Salaria: Applications Programming in C, Khanna Book Publishing Co. (P) Ltd., Delhi.
2. Byron Gotterfied: Programming in C, Tata McGraw Hill Publishing Company Ltd., Delhi.
3. Yashvant Kanetkar: Let Us C, BPB Publications, Delhi.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – I)
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CSL412: COMPUTER ORIENTED NUMERICAL & STATISTICAL METHODS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Errors and Sources of Propagation for Errors: Errors, Representation of fixed and floating point numbers, consequences due to fixed format representation, error estimation and types of errors.
Solution of Algebraic and Transcendental Equations: The bisection methods, iteration methods, method of false position, Newton Raphson method, rate of convergence of secant method, Newton Raphson methods.
Linear Systems of Equations: Direct Methods, Gausian Elimination Method, Lu Factorization, Solution of Tridiagonal Systems, Iterative Method, Gauss Seider and Gauss Jacobi Method.

UNIT-II

Interpolation Curve Fitting and Cubic Splines: Finite Differences, Backward, Forward, Lagrange's interpolation, Inverse Interpolations, Least square, curve fitting procedures, fitting a straight line, nonlinear curve fitting, Data fitting with cubic splines.
Numeric Differentiation and Integration: Numerical differentiation using interpolation method, numerical integration, Trapezoidal rule, Simpson's 1/8 rule, Simpson 3/8 rule.
Numerical Solution of Ordinary Differential equations: Euler method, Runge-Kutta method, Predictor corrector method.

UNIT-III

Average: Requisites of a good average, Various method of central tendency, selection and limitations of an average.
Dispersion: Meaning, Characteristics for an ideal measure of dispersion. Measures of dispersion (Mean deviation, Standard Deviation and variance.)
Skewness & Kurtosis Correlation: Types of correlation, Causation, Methods of studying correlation (only Karl-Pearson's method in detail), correlation in Bivariate frequency table.
Linear Regression Analysis: Standard error of an eliminate, correlation vs Regression analysis.

References:

1. R.S. Salaria: Numerical methods, A Computer Oriented Approach, BPB Publications, 1996.
2. S.C. Gupta: Fundamental of Statistics, Himalayas Publication House.
3. Gupta & Kapoor: Applied Statistics,Sultan Chand & Sons.
4. S.P. Gupta: Statistical Method, Sultan Chand & Sons.
5. S.S. Sastry: Introductory Methods of Numerical Analysis, 2nd Ed., PHI, 1995.
6. Jain, MK et. el.: Numerical Methods for Scientists & Engineers, Wiley Eastern Limited, New Delhi, 1993.
7. Rajaraman, V.: Computer Oriented Numerical Methods, PHI, 1993.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – I)
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ECL491: PRINCIPLES OF DIGITAL ELECTRONICS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Semiconductors: Junction diodes, Bipolar and FET transistors, biasing techniques, transistor as a switch.
Information Representation: Number systems, Integer and floating point representation, character codes (ASCII, EBCDIC), Error detecting and correcting codes.
Logic Design: TTL, STTL, CMOS logic families.

UNIT-II

Digital IC's: Logic gates, flip-flops, clocks and timers, shift registers, counters.
Boolean Algebra & Circuit Design: Basic laws of Boolean algebra, circuit design using standard (NAND) gates, Adder, coder / demultiplexer, encoder / multiplexer design.

UNIT-III

MOS & LSI Digital Systems: Semiconductor memory, static and dynamic devices, read only & random access memory chips, PROMS and EPROMS. Address selection logic. Read and write control timing diagrams for memory ICs.
Data Converters: Analog to digital and Digital to analog conversion techniques, Microprocessor compatible ADCs and basic interfacing techniques.
Digital Peripherals: Keyboard, multiplexed seven segment display, CRT display schemes, Printers, Control interfaces (parallel and serial) for the peripheral units.

References:

1. Integrated Electronics by Millman, Halkias, McGraw Hill.
2. Malvino: Digital Computer Electronics, McGraw Hill, 1990.
3. H. Taub & D. Schilling, Digital Integrated Electronics, McGraw Hill, 1977.
4. D.A. Hodges & H.G. Jackson, Analysis & Design of Digital Integrated.
5. Circuits, International Student Ed., McGraw Hill, 1983.
6. Richard S. Sandige, Modern Digital Design, McGraw Hill, 1990.
7. John F. Wakerley, Digital Principles and Practices, PHI, 1990.
8. Ujjenbeck, John: Digital Electronics; a modern approach, Prentice Hall, 1994.
9. Bignell J.W.: Digital Electronics, 3rd edition, 1993.
10. Mano, M. Morris: Digital Logic and Computer Design, 3rd edition, 1993.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – I)
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CSP410: PROGRAMMING LABORATORY-I

Credits		
L	**T**	**P**
0	0	2

Practical Exercises on Programming in C

Implementation of numerical & statistical methods using C language

Exposure to the MS-Office and Internet Applications.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – I)
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MTL408: MATHEMATICAL ELEMENTS OF COMPUTER SCIENCE

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Logic and Propositional Calculus: Proposition and Compound Propositions, basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Duality law, Algebra of propositions, Conditional and Biconditional Statements, Arguments, Logical Implication, Propositional Functions, Predicates and Quantifiers, Negation of Quantified Statements, Inference theory of the predicates calculus.
(05 Lectures)
Algebraic Systems: Operations, Semigroups, Groups, Subgroups, Normal Subgroups and Homomorphisms, Rings, Fields, Polynomials over a field. **(04 Lectures)**
Properties of the Integers: Order and Inequalities, Absolute Value, Mathematical Induction, Division Algorithm, Greatest Common Divisor, Euclidean Algorithm, Fundamental Theorem of Arithmetic, Congruence Relation, Congruence Equations. **(03 Lectures)**

UNIT-II

Graph Theory: Graphs and Multigraphs, Subgraphs, Isomorphic and Homeomorphic Graphs, Paths, Connectivity, Bridges of Konigsberg, Transversable Multigraphs, Labeled and Weighted Graphs, Complete, regular and Bipartite Graphs, Tree graphs, Planar Graphs, Graph Colorings, Representing Graphs in Computer Memory. **(05 Lectures)**
Directed Graphs: Directed Graphs, Basic Definitions, Rooted Trees, Sequential Representation of Directed Graphs, Warshall's Algorithm, Shortest Paths, Linked Representation of Directed Graphs, Graph Algorithms, Depth-first and Breadth-first searchers, Directed Cycle-Free Graphs, Topological Sort, Pruning Algorithm for Shortest Path. **(05 Lectures)**
Binary Trees: Binary Trees, Complete and Extended Binary Trees, Representing Binary Trees in Memory, Transversing Binary Trees, Binary Search Trees, Priority Queues, Heaps, path Lengths, Huffman's Algorithm, General (Ordered Rooted) Trees Revisited.
(04 Lectures)

UNIT-III

Recurrence Relations and Generating Functions: Polynomial expressions, telescopic form, recursion theorem, closed form expression, generating function, solution of recurrence relation using generating function. **(10 Lectures)**

Ordered Sets and Lattices: Ordered Sets, Hasse Diagrams of Partially Ordered Sets, Consistent Enumeration, Supremum and Infimum Isomorphic (similar) Ordered Sets, Well-ordered sets, Lattices, Bounded Lattices, Distributive Lattices, Complements, Complemented Lattices. **(04 Lectures)**

Boolean Algebra: Boolean algebra and its duality**,** Duality, Boolean Algebra as Lattices, Boolean identities, sub-algebra, Representation Theorem, Sum-of-Products Form for Sets, Sum-of-Products Form for Boolean Algebra, Minimal Boolean Expressions, Prime Implicants, Logic Gates and Circuits, Boolean Functions, Karnaugh Maps. **(05 Lectures)**

Books Recommended:

1. Trambley, J.P. and Manohar,R: Discrete Mathematical Structures with Applications to Computer Science.
2. Liu C.L.: Elements of Discrete Mathematics.
3. Alan Doerr and Kenneth Levasseur: Applied Discrete Structures for Computer Science.
4. Narsingh Deo: Graph Theory.
5. Lipschutz, S. and Lipson, M.: Discrete Mathematics (Schaum's out lines series).

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – II)
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CSL420: DATA & FILE STRUCTURES

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Preliminaries: Various data structures, common operations on data structures, algorithm complexity, big O notation, time-space tradeoff between algorithms.

Arrays: Arrays defined, representing arrays in memory, various operations on linear arrays, Multi- dimensional arrays, Records.

Linked Lists: Types of linked lists, representing linked lists in memory, advantage of using linked lists over arrays, various operation on linked lists.

Stacks: Description of stack structure, implementation of stack using arrays and linked lists. Applications of stacks - converting arithmetic expression from infix notation to polish and their subsequent evaluation, quicksort technique to sort an array, parenthesis checker.

UNIT-II

Queues: Description of queue structure, implementation of queue using arrays and linked lists, description of priorities queues. Applications of queues - Operating system simulations.

Trees: Description of tree structure and its terminology, binary search tree, implementing binary search tree using linked lists, various operations on binary search trees, AVL Trees, Threaded Binary Trees, B-Trees, B+ trees, Greedy Method: Knapsack Problem, Prim's and Kuruskal's Algorithm to find MSTs.

Heaps: Description of heap structure, implementing heaps using arrays, various operations on heaps, Applications of heaps – heapsort technique to sort an array, implementation of priority queues.

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UNIT-III

Graphs: Description of graph structure, implementing graphs in memory using adjacency matrix or adjacency lists, various graphs transversing algorithms, finding shortest path between two nodes, Dijkastra's shortest path algorithm., finding biconnected component, strongly connected component and finding cycles in the graphs.

Searching and Sorting: Linear Search, Binary search, Bubble Sort, Selection Sort, Insertion Sort, Merge Sort.

Hash Tables: Direct address tables, hash tables, collision resolution by chaining, hash functions, open addressing – linear probing, quadratic probing, double hashing.

Files: Operations on files, Types of files, File Organizations: Sequential files, Indexed Sequential file, Directed files and multi-key files, File performance criteria and terms.

References:

1. Seymour Lipschutz: Theory and Problems of Data Structures, Schaum Outline Series, McGraw-Hill Book Company.
2. Jeffery Esakov: Data Structures - An Advanced Approach Using C, Tom Weiss, Prentice-Hall International, Inc.
3. Trembley and Sorenson: An Introduction to Data Structures with Application, Tata-McGraw Hill Company, Delhi.
4. Tanenbaum: Data Structures and C.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – II)
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CSL421: COMPUTER ORGANIZATION AND ARCHITECTURE

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Basic computer Organisation and design: Register Transfer language & operations, various Arithmetic, Logic & Shift microoperations instructions, codes, computer registers, instructions, timing & control, instruction cycle, design of a complete basic computer & it's working.

Programming & controlling the basic computer: Machine & Assembly Language, hardwired & Microprogrammed control, Design of a control unit.

UNIT-II

CPU Architecture: General register & stack organization, instruction formats and addressing modes, ALU & Control unit architecture.

Memory Organisation: Memory hierarchy, main, auxiliary, cache memory, virtual memory paging and segmentation.

UNIT-III

I**/O Organization:** Peripheral Devices, input-output interface, Modes of data transfer programmed & interrupt initiated I/O, DMA, I/O Processors.

Parallel & Multiprocessing Environment: Introduction to parallel processing, pipelining, RISC Architecture, vector & array processing, Multiprocessing concepts, memory & resource sharing, interprocessor communication & synchronisation.

References:

1. Morris Mano: Computer System Architecture, PHI.
2. Hayes J.P.: Computer Architecture & Organisation, McGraw Hill.
3. Stone: Introduction to Computer Architecture: Galgotia.
4. Tanenbaum: Structured Computer Organisation, PHI.
5. Malvino, Brown: Digital Computer Electronics, TMH.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – II)
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CSL422: ADVANCES IN OPERATING SYSTEMS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Basic Concepts: History & Evolution of Operating System, OS as resource manager, Various views of OS.

Memory Management: Basic Memory management Schemes, Partition memory management, demand paged memory management, segmented memory management, swapping, hierarchy of memory.

Process Management: States of Processes, process scheduling, race conditions, deadlocks, banker's algorithm, precedence graphs, semaphores, monitors.

UNIT-II

Device Management: Dedicated devices, shared devices, virtual devices, channels, I/O traffic controller, I/O scheduler, I/O device handlers.

Information Management: Simple file system, Symbolic file system, logical file systems, physical file systems, security of file systems.

UNIT-III

Distributed Systems: Definition, Characteristics, Goals and application of Distributed Systems, Basic Design issues and User Requirements

Distributed OS: Introduction, The Kernel, Process and Threads, Communication.

Case Studies: Windows NT, Unix/ Linux

References::

1. Madnick and Donovan: Operating System, McGraw Hill, 1973.
2. P.B. Henson: Operating System Principles, Prentice Hall, 1973.
3. J.L. Peterson, A. Silberchatz: Operating System Concepts, Addison Wesley, 1983.
4. George Coulouris, Jean Dollimore, Tim Kindberg : Distributed Systems : Concepts and Design 2nd edition, Addison-Wesley Publishing Company.
5. A.S. Tenenbaum: Operating System: Design and Implementation PHI, 1989.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – II)
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CSP420: PROGRAMMING LABORATORY-II

Credits		
L	**T**	**P**
0	0	2

Implementation of Data and File Structures using C
Working knowledge of Windows NT/ UNIX/Linux.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – II)
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CBL496: ACCOUNTING AND FINANCIAL MANAGEMENT

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Preliminaries: Accounting Principles**:** Concepts and conventions, Double entry system of accounting, Accounting cycle, Preparation of Trial Balance.

Final Accounts: Trading, Profit and Loss A/cs and balance sheet of role proprietary concern. Interpretation of final accounts of companies, recent trends in presentation of financial statements.

Budgeting: Importance of Preparation of functional and master budgets.

UNIT-II

Marginal Costing: Importance of break even analysis, Applications of break even analysis & limitations.

Standard Costing: Analysis of variances with reference to material, labour and sales-Elementary treatment.

Financial Analysis: Techniques of financial analysis - common size, comparative, trend Analysis, Ratio Analysis : Types, advantages and limitations.

UNIT-III

Fund Flow & Cash Flow statements: Meaning & Importance, preparation and interpretation of these statements.

Introduction to Computerized Accounting System: Computer Applications in Financial, Material, Production, Marketing & Planning management, Sales/Order Transaction Processing Inventory, Billing & Sales, Accounts Receivable / Payable, Payroll, Labour, General Accounting System.

References:

1. Rockely, L.E., Finance for the Non-accountant, 2nd Edn, Basic Books, 1976.
2. Levy, and Sarnat, Principles of Financial Management, Prentice Hall.
3. Arnold, Financial Accounting, PHI.
4. Horngren and Sundem, Introduction to Financial Accounting, PHI.
5. Pandey I.M., Financial Management Vikas Publications, 1979.
6. Nigam Lal & Sharma, Advanced Cost Accounting, Himalaya Publishers.
7. Prasanna Chandra, Financial Management.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – II)
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MTL418: COMPUTER BASED OPTIMIZATION TECHNIQUES

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Linear Programming: Mathematical formulation of linear programming problems, Canonical and standard forms of linear programming problems, Solution by Graphical & Simplex method, Revised simplex method, Two phase & Big-M method, Duality, Primal-Dual Relationship, Dual Simplex method, Economic Interpretation of Optimal simplex Solution. Sensitivity Analysis: Changes in RHS values, Objective Function Coefficients, Constraint Coefficients, Addition of a new constraint/variable. (13 Lectures)

UNIT-II

Special Types of LPP: Transportation and Assignment Problems, Optimality, Special cases in Transportation and Assignment Problems, Game Theory: Two-person zero sum games, maximin-minimax principle, games without saddle points (Mixed strategies), graphical solution of $2 \times n$ and $m \times 2$ games, dominance property, arithmetic method of $n \times n$.
(09 Lectures)

Integer & Dynamic Programming: Integer programming problem, Branch and Bound Techniques. Characteristics, Deterministic DP Problems, Recursive Approach and Tabular method. (08 Lectures)

UNIT-III

PERT / CPM: Project Planning, Scheduling, Activity cost (05 Lectures)

Queuing models Queuing system, Elements and characteristics of queueing system, Distribution of arrival and departure, Poisson queueing models: (*M/M/1*): (∞/*FIFO*), (*M/M/1*): (∞/*SIRO*), (*M/M/1*): (*N/FIFO*), (*M/M/c*): (∞/*FIFO*), (*M/M/c*): (*N/FIFO*), Non-Poisson queueing models: $M / E_k / 1) : (\propto / FIFI)$, $(M / G / 1) : (\propto / GD)$. (10 Lectures)

Books Recommended:

1. Gass, S. L.: Linear Programming
2. Rao S.S.: Optimization Theory and Applications, Wiley Eastern.
3. Manmohan, Gupta P.K.: Operation Research, Sultan Chand & Co., New Delhi.
4. Swrup, Kanti: Operation Research, Sultan Chand & Co., New Delhi.
5. Hadley, G.: Linear Programming, Narosa, 1994.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – III)
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CSL510: OBJECT ORIENTED PROGRAMMING

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Programming Paradigms: Introduction to the object oriented approach towards programming by discussing Traditional, Structured Programming methodology, its shortcomings, advantages of OOPS (Object Oriented Programming Style), Traditional Vs OOPS Software Life Cycle.
Objects & Classes: Object Definition, Instance, Encapsulation, Data Hiding, Abstraction, Inheritance, Messages, Method, Polymorphism, Classes, Candidate & Abstract Classes to be examples of the Design process.
Responsibilities & Collaborations: Definition of Responsibilities, Identifying & Assigning Responsibilities to form classes, Examine Relationship between classes, Define Collaborations.

UNIT-II

Hierarchies & Subsystems: Hierarchy Graphs, Building Hierarchies, Identifying Contracts, Collaboration Graphs, Subsystems, Implementation issues.
Object Oriented Programming using C++: Characteristics of OOP, Overview of C++, I/O using cout and cin, Objects and Classes, Member functions and data, private & public, constructor & destructor, Constructor Overloading, Types of Constuctors.
Operator Overloading: Overloading unary and binary operators, Type Conversion using Operator Overloading

UNIT-III

Inheritance: Concept of inheritance, Base & derived classes, Access Specifiers, Class Hierarchies, Types of Inheritance with examples.
Virtual Functions and Polymorphism: Virtual functions, friend functions, static function, this pointer, polymorphism, Types of Polymorphism with examples, templates, class templates.
File Handling using C++.

References:

1. Designing Object Oriented Software Rebacca Wirfs - Brock Brian Wilerson, PHI.
2. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Publication.
3. Designing Object Oriented Applications using C++ & Booch Method, Robert C. Martin.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – III)
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CSL511: THEORY OF COMPUTATIONS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Non Deterministic Finite Automata, Deterministic Finite Automata, - moves, regular expressions, crossing sequence. Moore and Mealy machines.
Pumping lemma for regular sets, Minimisation algorithm.

UNIT-II

Context free grammar, derivation Trees, Chomesky & Greibach normal forms.
Pushdown automata, pumping lemma for CFL's, Ogden's lemma, Turing machines.

UNIT-III

Undecidability, Recursive and recursively enumerable languages, Rice theorem, Post's correspondence problem.

Introduction to regular grammars, unrestricted grammars context sensitive languages, LR(k) grammar and trios.

References:

1. A.V. Aho, J.E. Hopcroft and J.D. Ullman, 'Introduction to Automata, Languages and Computations', Addison Wesley, 1980.
2. H.R. Lewis and C.H. Papdimitrou, ' Elements of the Theory of Computation', Prentice Hall Inc., 1981.
3. V.J. Rayward Smith, 'A First Course on Computability', Blackwell Scientific Publications, Oxford, 1986.
4. M.Davis and E.J. Weyuker 'Computability, Complexity and Languages' Academic Press, 1982.
5. D. Gries, 'Science of Programming', Springer Verlag, New York, 1981.
6. Dewire, Dawna Tranis : Client Server Computing, McGraw Hill, 1994.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – III)
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CSL512: MICROPROCESSOR AND ITS APPLICATIONS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction: Introduction to Microprocessor, Microcontroller and Microcomputer.
Architecture of a Microcomputer: General Architecture of a microcomputer system. Microprocessor unit, input unit, output unit, memory unit and auxiliary storage unit.
Architecture of 8086/ 8088 Microprocessor: Description of various pins, configuring the 8086/8088 microprocessor for minimum and maximum mode systems description of maximum system mode interfaces, internal architecture of the 8086 / 8088 microprocessor, system clock, Bus cycle, instruction execution sequence.

UNIT-II

Memory Interface of the 8086 / 8088 microprocessor: Address space and Date organization, generating memory addresses, hardware organization of the memory address space, memory bus status codes, memory control signals, read/write bus cycles, the role of stack in intrrupts and subroutine cells; demultiplexing the address data bus, program and data storage memory, dynamic RAM system.
Input /Output Interface of the 8086 / 8088 microprocessor: I/O Interface, I/O address space and data transfers, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripherals Interface (PPI), memory- mapped, I/O, serial communication interface (USART and UART) - the RS-232 C interface, 8251A programmable communication interface, special purpose interface controllers.

UNIT-III

Interrupt Interface of 8086/8088 microprocessor: What is interrupt? Types of interrupt, Interrupt Vector Table (IVT)
8086/8088 assembly language programming: General structure of an assembly language program, steps in the development of an assembly language program, Assembly language V/S machine language, addressing modes, Instruction set : data movement instructions, arithmetic instructions, logical instructions, shift and rotate instructions, jumping and looping instructions, string processing, interrupt instructions, stack operations, subroutines, handling instructions, defining and using macros.
Programming exercises must be design to show how the input/output is performed. How decisions are made and how loops can be set in an assembly language programs.

References:

1. Walter Triebel: The 8086 Microprocessor - Architecture, Software and Interfacing Techniques, PHI, Delhi.
2. Walter Triebel: The 8088 Microprocessor - Architecture, Software and Interfacing Techniques, PHI, Delhi.
3. Douglas V. Hall: Microprocessors and Interfacing - Programming and Hardware, Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Peter Abel: IBM PC Assembly Language and Programming, PHI, Delhi.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – III)
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CSL513: INFORMATION SYSTEM

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction to System Theory, Concepts of Information, Attributes of Information, Evolution of Information Systems, Categories of Information Systems, Building and Maintaining Information Systems, Information System Security and Control.

Introduction to Management Information System, Fundamental types of Management Information Systems, Role of Information Systems in an Organization. Management Decision, Pitfalls in MIS Development Making,

UNIT-II

Decision Support Systems (DSS), Conceptual Foundations of DSS, Concepts of DSS, DSS Software, Strategies for DSS, GDSS, and Executive Support System (ESS), Fundamentals of Knowledge Management systems, Knowledge Based Decision Support; Artificial Intelligence and Expert systems, Expert System & its integration with DSS.

UNIT-III

Product, Customer and competitive Advantage; the Customer's view of product, the Customer's cycle of involvement with a product, the Customer's criteria for evaluating the product, using Information systems for competitive Advantage, Fundamentals of electronic commerce, Supply chain management, Customer Relationship Management (CRM). Ethical and Social Impacts of Systems, Management of International Information System.

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Case Studies: (Reference No. 1) Analysis & Design of an Inventory control System, Computerization in an Indian Private Bank. Computerization of Stock exchanges in India, Implementation of ERP Package, Healthcare Industry Solutions.

References:

1. Ashok Arora, Akshaya Bhatia : Information System for Managers, Excel Books, 1999.
2. Laudon C. Kenneth & Laudon P. Janes : Management Information Systems, Pearson Education, 2002.
3. Turban Ejraini & Aronson E. Jay : Decision Support Systems & Intelligent Systems, Pearson Education, 2001.
4. Mudrick R.G., Ross, J.E. & Glegge, J.R. : Information Systems for Modern Management, 3rd Edition, Prentice Hall of India, 1987.
5. Alter Steven : Information Systems , 3rd Edition, Pearson Education,2000.
6. McNurlin C.Barbara & Spargue H. Ralph: Information Systems Management in Practice, fifth Edition,Pearson Education, 2003.
7. Kumar Muneesh: Business Information System. Vikas Publishing House Pvt Ltd. 1998.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – III)
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CSL514: DATA BASE MANAGEMENT SYSTEMS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Basic Concepts: An overview of Database Management (Database, Database System, why database, Data independence) An architecture for a database system (levels of the architecture, mappings, DBA, client/server architecture) Introduction to Relational db systems.
ER Model: Overview, ER diagrams, Database design using ER model.

UNIT-II

The Relational Model: Relational Data Objects: Domains and relations, Integrity Constraints, Relational Algebra, Relational Calculus and SQL Language. Working knowledge of DDL, DML and DCL based statements for generating queries is to be provided.
Relational Database Design: Concepts of functional dependencies, multivalued dependencies, 1NF, 2NF, 3NF, BCNF, Higher Normal Forms.

UNIT-III

Advanced Concepts in Relational Databases: Recovery, Concurrency, Security, Integrity, Query Optimization.
Advanced Database Concepts: Overview of Distributed Databases, Object Oriented Databases, Object-Relational Databases

Reference:

1. C.J. Date, "An Introduction of Database System", The Systems Programming Series, 6/Ed, Addison-Wesley Publishing Company, Inc., 1995.
2. Silberscatz, Korth and Sudarshan, "Database System Concepts", Third Ed., McGraw Hill International Editions, Computer Science Series-1997.
3. Parteek Bhatia and Gurvinder Singh, "Simplified Approach to DBMS", Kalyani Publishers.
4. Desai, Bipin C, "An Introduction to Database Systems", West Publishing Company, St. Paul, Minnesota, USA-1993.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – III)
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CSP510: PROGRAMMING LABORATORY - III

Credits		
L	**T**	**P**
0	0	2

Hands on practice of SQL statements with different clauses available using Oracle 8i or higher version
Implementation of OO Concepts using C++

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – IV)
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CSL520: KNOWLEDGE BASED SYSTEM

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction: Artificial Intelligence**,** Its applications & importance.
Knowledge Representation: Definition & importance of Knowledge, Approaches & issues, predicate logic, production rules, semantic networks, frames, conceptual graphs, Object Oriented representation.

UNIT-II

State Space & Search: Defining problem as state space search, problem characteristics, Blind search, Heuristic search, hill climbing, Best-first, constraint satisfaction.
An overview of AI Programming Languages: Features of LISP, PROLOG, C++.
Natural Language Processing: Grammars & Languages, Paring techniques, RTN, ATN.

UNIT-III

Expert System: Shells, Architectures, Knowledge Acquisition, Case Study MYCIN.
Non – Monotonic & Probabilistic Reasoning: Truth maintenance system, Baysean Networks, Fuzzy logic.
Pattern Recognition: Introduction, recognition & Classification process, clustering.

References:

1. E. Rich & K. Knight, Artificial Intelligence, Tata McGraw Hill, 1991.
2. D.W. Pattern, Introduction to Artificial Intelligence & Expert Systems.
3. G.F. Luger & W.A. Stubblefield, Artificial Intelligence - Structures & Strategies for Complex Problem solving, Second ed. 1993. Benjamin / Cummings
4. Rebert J. Schalkoff, Artificial Intelligence, An Engineering Approach, McGraw Hill, 1990.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – IV)
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CSL521: COMPUTER NETWORKS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Network definition, network hardware and software, Network topologies, uses of computer networks, Transmission media, OSI Reference models, TCP/IP Reference model, Comparison of OSI and TCP Reference models.

Fourier Analysis, Analog and Digital Transmission, Switching, ISDN services, Transmission in ATM networks.

UNIT-II

Framing, Error Detection and Correction, Elementary Data Link and Sliding Window Protocols, Channel allocation in LANs and WANs, Multiple Access Protocols and IEEE standards 802, High speed LANs.

Design Issues of Network Layer, Routing algorithms, Congestion control algorithms, Internetworking, Repeaters, Routers.

UNIT-III

Services and Elements of Transport Protocols, RPC.

Network Security and Privacy – Data Representation, Fundamentals of Data Compression Techniques and Cryptography.

Network Services- File Transfer, Access and Management, Electronic mail, Remote Login.

References:

1. Tannanbaum, A.S. : Computer Networks, Prentice Hall, 1992 2nd Ed.
2. Tannanbaum, A.S. : Computer Networks, Prentice Hall, 1992 3rd Ed.
3. Stallings, William : Local Networks : An introduction Macmillan Publishing Co.
4. Stallings, William : Data & Computer Communication Macmillan Publishing Co.
5. Black : Data Networks (PHI) 1988.
6. Forouzon Behrouz: Data Communications, Tata McGraw Hill, 2007.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – IV)
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CSL522: COMPUTER GRAPHICS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Elements of Computer Graphics: Introduction to computer graphics; graphics display devices; interactive control devices; output devices; display processors.

2D Graphics
Elementary Drawing Algorithms: Line drawing using direct method, simple DDA, integer DDA, incremental method, and Bresenham's algorithm; Circle drawing using incremental method and Bresenham's algorithm, drawing arcs, sectors, etc. Flood Fill Algorithms, Boundary Fill Algorithms
Geometric Transformations: Translation, rotation, scaling, reflection and shear; concept of homogenous coordinates, Building composite transformations.
Viewing Transformations: Concept of windows & viewport, window-to-viewport mapping, clipping operations - point clipping, line clipping algorithms (Cohen - Sutherland, mid-point subdivision, Cyrus - Beck), Sutherland - Hodgman polygon clipping algorithm.

UNIT-II

3D Graphics
Drawing 3D Shapes: Coordinate systems, representation of 3D shapes, designing curves and surfaces (Hermite, Bezier, and B-Spline).

Geometric Transformations: Translation, rotation, scaling and reflection.

Projective Transformations: Parallel projections - orthographic, axonometric (isometric, diametric and trimetric), oblique projectios; and perspective projections (one, two and three vanishing points).

Viewing Transformations: Viewing a 3D object, 3D clipping (extension of specified 2D algorithms to handle 3D objects).

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UNIT-III

Hidden line/surface Removal: Back face removal, z-buffer algorithm, Painters (depth sort) algorithm, subdivision algorithms - Warnock's algorithm, scan line algorithms - scan line z-buffer algorithm.
Rendering: Introduction, a simple illumination model, shading - Gouraud shading & Phong shading, ray tracing, shadows, textures.

References:

1. David F. Rogers: Procedural Elements for Computer Graphics, McGraw Hill Book Company.
2. Adams & David F. Rogers: Mathematical Elements of Computer Graphics, McGraw Hill Book Company.
3. Roy A. Plastock, Gordon Kalley: Computer Graphics, McGraw Hill Book Company.
4. Donald Hearn & M. Pauline Baker: Computer Graphics, Prentice Hall of India Private Limited.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – IV)
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CSL523: SYSTEM SIMULATION

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction: Concept of a system, stochastic activities, continue and discrete system, system modeling, mathematical modeling, principle used in modeling.
Simulation of Systems: Concepts of simulation of continuous systems with the help of two examples; use of integration formulas; concepts of discrete system simulation with the help of two examples, Generation of random numbers, Generation of non-uniformly distributed numbers.

UNIT-II

Simulation of Queuing Systems: Rudiments of queuing theory, Simulation of Single-Server queue, two-server queue, general queues.
Simulation in Inventory Control and Forecasting: Elements of inventory theory, inventory models, Generation of Poisson and Erlang variats, forecasting and regression analysis.

UNIT-III

Design and Evaluation of Simulation Experiments: Experimental layout and validation.
Simulation Languages: Continuous and discrete simulation languages, Block-Structured continuous simulation languages, expression based languages, discrete system simulation languages, simscript, GPSS, SIMULA, Simpack, GASP IV, CSIM, factors in selection of a discrete system simulation languages.
Case Studies: Analytic Vs Simulation Models, Applications to Operating Systems, Databases, Computer Networks Architectures.

References:

1. Narsingh Deo, “System Simulation with Digital Computer”, Prentice-Hall of India Pvt. Ltd. - 1993.
2. Gordon, “System Simulation”, Prentice Hall of India Pvt. Ltd. - 1993

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – IV)
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CSP520: PROGRAMMING LABORATORY - IV

Credits		
L	**T**	**P**
0	0	2

Development of Websites, JAVA 2.0 / Front Page 2000 / HTML 4.0, ASP.
Implementation of Computer Graphics using C/C++

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – V)
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CSL611: SYSTEM SOFTWARE

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction to System Software: Evolution of System Software, components of system software, Translators, loaders, interpreters, compiler, assemblers.

Assemblers: Overview of assembly process, design of one pass and two assemblers.

UNIT-II

Macroprocessors: Macro definition and expansion, concatenation of macro parameters, generations of unique labels, conditional macro expansion, Recursive macro expansion.

Compilers: Phases of compilation process, logical analysis, parsing, storage management optimisation. Incremental compilers, cross compilers, P code compilers.

UNIT-III

Loaders and Linkage editors: Basic loader functions. Relocation, program linking, linkage, editors, dynamic linking bootstrap loaders.

Other system software: Operating system, DBMS, text editors, Interactive debugging systems.

References:

1. Leland L. Beck : System Software, An introduction to system programming, Addison Wesley.
2. D.M. Dhamdhere : Introduction to System Software, Tata McGraw Hill.
3. D.M. Dhamdhere : System Software and Operating System, Tata McGraw Hill, 1992.
4. Madrich, Stuarte : Operating Systems, McGraw Hill, 1974.
5. Stern Nancy Assembler Language Programming for IBM and IBM compatible computers, John Wiley, 1991.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – V)
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CSL612: SOFTWARE ENGINEERING

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Principles of Software Engineering, Phases of software development and life cycle.
Software project planning and quality requirement analysis.

Software design concepts, object oriented design & methods.

UNIT-II

Software engineering features (data abstraction exception handling and concurrency mechanism).

Software testing and debugging, Software documentation procedures, Software reliability and quality assurance. Quality Matrics and software models.

UNIT-III

Software maintenance and configuration management.

Software engineering tools and environment, International software engineering standards and their relevance Case studies in software engineering.

Reference:

1. A.Harry: Introduction to Formal Methods, Software Engineering Practice.
2. Hans Van Vliet: Software Engineering, Principles and Practice.
3. Pressman: Software Engineering: A Practitioner's Approach, 3rd Ed.
4. Flecher and Hunt: Software Engineering and CASE: Bridging and Culture Gap.
5. Shepperd : Software Engineering, Metrics, Volume 1 (EN)
6. Robert S. Arnold: Software Re-engineering, IEEE Computer Society, 1994.
7. Pankaj Jalote: An Integrated Approach to Software Engineering, Narosa, Publishers, 1992.
8. Easted, Charles & G. Davies: Software Engineering Analysis & Design, McGraw Hill, 1989.
9. Ghezzi, Cario: Fundamentals of Software Engineering, PHI, 1994.
10. Sommerville, Ian: Software Engineering, 4th edition, Addison Wesley, 1992.

MASTER OF COMPUTER APPLICATIONS (MCA) (SEMESTER – V)
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CSP610: PROGRAMMING LABORATORY - V

Credits		
L	**T**	**P**
0	0	2

Practical Exercises on System Programming concepts and Assembly Language.

MASTER OF COMPUTER APPLICATIONS (MCA) (ELECTIVES – I)
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CSL614: ARTIFICIAL NEURAL NETWORKS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Basics of Neural Networks: Connectionist Models and their structures, Multilayer Perception & Back Propagation Networks, Gradient Descent.
Some Representation Issues: Representing Boolean function, Distributed Representation, Representing Real - valued Functions.

UNIT-II

Single Layer Models: Perception learning and pocket Algorithm.
Autoassociators and one-shot learning: Linear Autoassociators and the interproduct Training Rule Hopfield Model, Associative Memories.
Mean Squared Errors (MSE) Algorithms: MSE Approximation, The Widrow-Hoff Rule, ADALINE.
Un-supervised Learning: K-Means Clustering, Topology-Preserving maps, Adaptive Resonance Theory.

UNIT-III

Back Propagation: Algorithms, Derivation, Practical Considerations.
Introduction to Some Applications: NETTALK, Handwritten Character Recognition, Travelling Salesman Problem.
References:

1. Gallant Stephen I : Neural Network Learning & Extent Systems, MIT Press, 1993.
2. Aleksander & Morton : Neural Computing, Chapman & Hall, 1991.
3. Kosko : Neural Networks & Fuzzy Systems, PHI, 1991.
4. Hertz John, Krough Anders, G. Palmer : Introduction to the theory of Neural Computation, Addison-Wesley, 1991.
5. Muller B. Reinhardt J., : Neural Networks An Introduction" , Springer Verlag, 1991.
6. Aleksander Igor, : An Introduction to Neural Computing, Chapman and Hall, 1992.
7. Caudill Maureen, Understanding Neural Networks : Computer Explorations, MIT Press, 1993.
8. Fausett Laurene : Fundamentals of Neural Networks.

MASTER OF COMPUTER APPLICATIONS (MCA) (ELECTIVES – I)
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CSL615: IMAGE PROCESSING

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Background: Introduction to electronic systems for image transmission and storage, computer processing and recognition of pictorial data, overview of practical applications. [5%]
Fundamentals: Mathematical and perceptual preliminaries, human visual system model, image signal representation, imaging system specification building image quality, role of computers, image date formats. [15%]

UNIT-II

Image Processing Techniques: Image enhancement, image restoration, image feature extraction, image data compression and statistical pattern recognition. [45%]
Hardware Architecture for image processing: Distributed processing of image data, role of array processing, standard image processor chips (as example). [10%]

UNIT-III

Techniques of colour image processing: Colour image signal representation, colour system transformations, extension of processing techniques to colour domain. [15%]
Applications of Image Processing: Picture data archival, machine vision, medical image processing. [10%]

References:

1. Pratt, W.K. Digital Image Processing, John Wiley, N.Y. / 1978.
2. Rosenfield, A. and Kak, A.C., Picture Processing **,** Academic Press, N.Y., 1982.
3. Jain, A.K., Fundamentals of Digital Image Processing, Englewood Cliffs, Prentice Hall, 1989.

MASTER OF COMPUTER APPLICATIONS (MCA) (ELECTIVES – I)
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CSL616: PERFORMANCE & EVALUATION OF COMPUTER SYSTEMS

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction: Uni/multi programmed Batch processing and interactive Ref. Systems. Turnaround time, response time, through put, concept of evaluation techniques.

UNIT-II

Workload: Issues related with workload characterization, representativeness of a workload model, testworkloads, workload implementation techniques and workload forecasting for capacity planning.
Tuning Methodology: Basic considerations, Bottleneck detection, Balancing a multiprogramming system, improving as interactive system, Reducing program execution time.

UNIT-III

Analytic Models: Study of various analytic models for operating analysis, I/O load balancing.
Economic Considerations: Cost and Benefits of a tuning study.

References :

1. Measurement and Tuning of Computer Systems. By Domenico Ferran, Giucppe Serazzi and Alestandro Zeigner Prentice Halls, Inc. Englewod Cliffs, NJ 07632-1983.

MASTER OF COMPUTER APPLICATIONS (MCA) (ELECTIVES – I)
(Under Credit Based Continuous Evaluation Grading System)

CSL617: DISTRIBUTED PROCESSING

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction: Definition, Characteristics, Goals and applications of Distributed Computing, Basic design issues and user requirements.
Interprocess Communication: Client Server Communication, Group Communication, IPC in UNIX, Remote Procedure Calls, Design issues and implementation.

UNIT-II

Distributed Operating Systems: Introduction, The Kernel, Process and Threads, Communication.
Distributed Transactions: Simple distributed transactions and Nested transactions, Atomic Commit protocols, Concurrency control, N distributed transaction, Distributed deadlocks, Transactions with replicated data.

UNIT-III

Recovery and fault Tolerance: Transaction recovery, Fault tolerance, Hierarchical and group masking of faults.

Reference:

1. George Coulouris, Jean Dollimore, Tim Kindberg : Distributed Systems : Concepts and Design 2nd edition, Addison-Wesley Publishing Company.

MASTER OF COMPUTER APPLICATIONS (MCA) (ELECTIVES – I)
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CSL618: EMERGING TRENDS IN INFORMATION TECHNOLOGY

Credits		
L	**T**	**P**
4	0	0

UNIT-I

Introduction to Information Technology: Latest development in Computer hardware : RISC V/S CISC architecture, Intel V/S Motorola chips, Computer peripherals.
Latest developments in Software: Programming Paradigms, Software Agents, Interoperable objects.

UNIT-II

Data Management technologies: Data Ware Housing and Data Mining, Data Marts and Conceptual Foundation of ERP.
Networking Technologies: Computer Networks, LAN, WAN, MAN, topologies, Internet, ISDN, PSDN, Wireless Networks, Internet Telephony, Virtual learning environment, Mobile communications, IP Addressing.

UNIT-III

Audio and Video Conferencing: Technology & Applications, Application to information technology to various function areas such as education, banking, communication etc.

MASTER OF COMPUTER APPLICATIONS (MCA) (ELECTIVES – VI)
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CSE620: MAJOR PROJECT

Credits		
L	**T**	**P**
0	0	26

A candidate should work on the project for 5 months and 6-8 hours on each working day.

Ist synopsis (containing mainly literature survey corresponding to the problem taken up for the project work and line of attack to solve the problem) within one month of joining the training is to be submitted and will be evaluated for 4 credits.

IInd synopsis (containing essentially the progress of work in comparative details) within three months of joining the training is to be evaluated will be evaluated for 7 credits.

Credits for Final Project Report & Viva Voce: 15