SCHEME OF TEACHING AND EXAMINATIONS 2018-2019
MASTER OF COMPUTER APPLICATIONS

FIRST SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+(T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA101	Object Oriented Programming With 'C++'	3	2	-	4	100	50	-	150	40	30	-	70
MCA102	RDBMS and SQL	3	2	-	4	100	50	-	150	40	30	-	70
MCA103	Mathematical Foundations of Computer Science	3	2	-	4	100	50	-	150	40	30	-	70
MCA104	Computer System Architecture	3	2	-	4	100	50	-	150	40	30	-	70
MCA105	Professional Communication in English	3	2	-	4	100	50	-	150	40	30	-	70
MCA106	Programming Lab	-	-	3x2	3	-	25	100	125	-	15	50	65
MCA107	Programming Practice	-	-	3x2	3	-	25	100	125	-	15	50	65
	TOTAL	15	10	12	26	500	300	200	**1000**	200	180	100	**480**

03-08-2018

FIRST SEMESTER
Object Oriented Programming with 'C++'
Subject Code - MCA101

Max Marks : 100 **Min Marks : 40**

UNIT - I : Language Fundamental
Overview of OOP: The Object Oriented paradigm, Basic concepts of OOP, Benefits of OOP, Object oriented languages,Application of OOP
Overview of C++: History of C++, **Data Types:** Built-in data types, User-defined data types, Derived data types. **Constants and Variables:** symbolic constants, Dynamic initialization of variable, Reference variable. Operators in C++.**Control Structures:**if-else, nested if-else, while, do-while, for, break, continue, switch, goto statement.

UNIT - II : Structure & Function
Structures: A Simple structure,Defining a structure variable, Accessing structures member, Enumeration data type.
Function: Function Declaration, Calling Function, Function Definition,***Passing Arguments to function:***Passing Constant, Passing Value, Reference Argument, Structure as argument, Default Argument.
Returning values from function:return statement, Returning structure variable, Return by reference. Overloaded Function, Inline Function,Templates.

UNIT - III : Object Classes and Inheritance
Object and Class, Defining the class and its member, Making an outside function inline, nesting of member function, array as class member, structure and classes.
Memory allocation: memory allocation for objects, new and delete operator, static datamember, static member functions, object as function argument.
Constructor & Destructor: Null and default constructor. Parameterized constructor, Constructor with default argument, copy constructor , class destructors, **Inheritance:** Introduction to inheritance, Types of inheritance ,function overriding, Constructor in Derived class. **Access specifiers:**public,private,protected.

UNIT - IV : Pointers, Virtual Function and Operator Overloading
Pointers: Introduction,& and * operator, pointer to object, this pointer , pointer to derived class.
Dynamic polymorphism: Virtual function, Pure Virtual Function, Abstract class.
Static Polymorphism: Operator keyword,overloading unary operator(++(pre increment and post increment),--) using operator function, overloading binary operators (+,-,==,>=,<=, +=,<,>,[]), Friend function, Friend class, overloading binary operators using friend function.

UNIT - V :File & Stream
File and Stream: C++ Stream class, unformatted I/O operations, formatted console I/O, manipulators, opening and closing a file,detecting eof, file modes, get(), put(),reading and writing a class object, Updating a file random access.

RECOMMENDED BOOKS :

1. **Object Oriented Programming with C++** : *E. Balagurusamy*, The McGraw-Hill
2. **Object Oriented Programming**: *McGregor and Sykes S A*, 1992 Van Nostrand.
3. **The C++ Programming Language**: *BjarneStroustrup*,AddisionWasley.
4. **Object Oriented Programming in C++** :*Robert Lafore*, Galgotia Publications.
5. **Introduction to Object Oriented Programming** :*K V Witt*, Galgotia Publications.
6. **Object Oriented Programming**: *G Blaschek*, Springer Verlag
7. **Object Data Management**: *R Cattel*, Addison Wasley.

03-08-2018

FIRST SEMESTER
RDBMS and SQL
Subject Code - MCA102

Max Marks : 100 **Min Marks : 40**

UNIT - I: Overview of Database Management

Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases, Client/Server databases, Object-oriented databases, Object-relational databases, Introduction to ODBC concept.

UNIT - II: Relational Model & Relational Algebra

Entity - Relationship model as a tool for conceptual design-entities, attributes and relationships. ER diagrams; Concept of keys; Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features, Introduction to UML, Representation in UML diagram (Class Diagram etc.).

Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self-join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages.

UNIT - III: SQL and Relational Database Design

Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING… ORDERBY….), INSERT, DELETE, UPDATE, DROP, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces. Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, Denormalization, Clustering of tables, Clustering indexes.

UNIT - IV: PL/SQL

Introduction to PL/SQL variables – literals – data types – advantages of PL/SQL; Control statements : if ; iterative control – loop, while, for , goto ; exit when; Cursors : Types – implicit, explicit – parameterized cursors – cursor attributes; Exceptions: Types – internal , user-defined , handling exceptions – raise statement; PL/SQL tables and records: Declaring PL/SQL tables - referring PL/SQL tables, inserting and fetching rows using PL/SQL table, deleting rows; records - declaration of records - deleting records; Sub programs: Functions - procedures - in, out, inout parameters; purity functions - packages - package specification - advantages of packages - private and public items - cursors in packages.

UNIT - V: Query Processing and Optimization

Query Processing, Protecting Database and Data Organization -Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL. **Data Organization-File Organization:** Fixed length records, variable length records, Organization of records in files, **Indexing:** indexed files -B-tree, B+-tree, and Hashing Techniques.

BOOKS RECOMMENDED :

1. **Database System Concept**: *A. Silberschatz , H.F. Korth and S. Sudarshan*, TMH
2. **Fundamentals of Database Systems**: *Elmasri&Nawathe*, Pearson Education
3. **An Introduction to Database Systems**: *C. J. Date*, AWL Publishing Company
4. **SQL, PL/SQL**: *Ivan Bayross*, BPB Publication
5. **An Introduction to database systems**: *Bipin Desai*, Galgotia Publication.
6. **Database Management System**: *A. K. Majumdar& P.Bhattacharya*, TMH

03-08-2018

FIRST SEMESTER
Mathematical Foundations of Computer Science
Subject Code - MCA103

Max Marks : 100 **Min Marks : 40**

UNIT – I : Mathematical Logic, Sets Relations and functions
Mathematical Logic: Notations, Algebra of Propositions & Propositional functions, logical connectives, Truth values & Truth table Tautologies & Contradictions, Normal Forms, Predicate Calculus, Quantifiers.
Set Theory: Sets, Subsets, Power sets, Complement, Union and Intersection, De-Morgan's law Cardinality.
Relations: Cartesian Products, relational Matrices, properties of relations.
Equivalence relation functions: Injection, Surjection, Bijection, Composition, of Functions, Permutations, Cardinality, the characteristic functions recursive definitions, finite induction.

UNIT – II: Lattices & Boolean Algebra
Lattices: Lattices as Algebraic System, Sub lattices, some special Lattices(Complement, Distributive, Modular).
Boolean algebra: Axiomatic definitions of Boolean algebra as algebraic structures with two operations, Switching Circuits.

UNIT – III: Groups Fields & Ring
Groups : Groups, axioms, permutation groups, subgroups, co-sets, normal subgroups, free subgroups, grammars, language).
Fields &Rings: Definition , Structure, Minimal Polynomials, Irreducible Polynomials,Polynomial roots & its Applications.

UNIT - IV: Graphs
Graphs: Simple Graph, Multigraph&Psuedograph, Degree of a Vertex, Types of Graphs, Sub Graphs and Isomorphic Graphs, Operations of Graphs, Path, Cycles and Connectivity, Euler and Hamilton Graph, Shortest Path Problems BFS(Breadth First Search, Dijkastra's Algorithm, Representation of Graphs, Planar Graphs, Applications of Graph Theory.

UNIT - V: Trees
Trees : Trees, Properties of trees, pendant vertices in a tree, center of tree, Spanning tree,Binary tree, Tree Traversal, Applications of trees in computer science.

BOOKS RECOMMENDED:

1. **A text book of Discrete Mathematics:***Swapan Kumar Sarkar.*S.Chand& company Ltd.
2. **Discrete Mathematical structure with applications to computer science:** *J.P Trembly& R. Manohar.* TMH
3. **Discrete Mathematics:** *K.A Ross and C.R.B Writht.*
4. **Discrete Mathematics Structures for computer science:** *Bernard Kolman& Robert C. Bushy.*
5. **Discrete Mathematics:** *Seymour Lipschutz Mare Lipson.*TMH Edition.

03-08-2018

FIRST SEMESTER
Computer System Architecture
Subject Code - MCA104

Max Marks : 100 **Min Marks : 40**

UNIT – I Representation of Information and H/w component:
Number system (decimal, BCD, octal, hexadecimal) and conversions, r and r-1's complement, Fixed and Floating point representation, Binary codes: Excess-3, ASCII, EBCDIC, Error detection codes. Boolean Algebra, Map simplification K-Map, Logic Gates, **Combinational Circuit:** Half and Full Adder, Decoder and Multiplexer; **Sequential Circuit:** Flip-Flop (SR, D, JK, Master-Slave,T), 4 bit Register, Register with parallel load, Shift register,Binary ripple Counter,Binary synchronous counter.

UNIT – II Register transfer language and micro operations
Register Transfer Language (RTL), Concepts of bus, Bus and Memory transfers,**Micro-operation:** Arithmetic, Logic and Shift micro operation,Instruction code, Computer registers, Computer instructions, Timing and control, Instruction Cycle and Interrupt Cycle, Memory reference instructions, Input-output and interrupt, Design of basic computer

UNIT – III Programming Computers and CPU
Machine Language, Assembly Language, Assembler, Program Loops, Input /Output, Programming,General register organization, Stack organization, Instruction format, Addressing modes, Data transfer and manipulation language, Micro-programmed and Hardwired control, RISC Vs. CISC, **Pipelining in CPU design:**, Parallel Processing ,Arithmetic and RISC pipelining.

UNIT – IV Computer Arithmetic and I/O Techniques: Addition, Subtraction, Division and Multiplication Algorithm, Input-Output Interface, asynchronous data transfer; **Modes of transfer:** Programmed I/O, Interrupt Mechanism, Direct Memory Access (DMA), I/O Processor.

UNIT – V Memory Organization
Memory hierarchy: Static and Dynamic RAM, ROM; Building large memory using chips, Associative Memory: associative mapping, Direct mapping, set associative mapping; Cache Memory Organization, Virtual Memory.

BOOKS RECOMMENDED:

1. Computer System Architecture, Morris Mano ,PHI, 3rd Edition)
2. Computer Organization and Architecture ,William Stalling (PHI), 2000
3. Computer organization and Architecture ,J.P.Hayes (TMH), 3rd Edition.
4.Digital Computer Logic Design , Morris Mano ,PHI,3rd Edition
5.Computer System Architecture and organization,Dr.M. Usha,T. S. Shrikant,Wiley publication.
6. Digital Computer Electronics - Malvino.
7. Structured Computer Organization - Andrew M. Tanenbanm (PHI).
8.Modern Digital Electronics - R.P.Jain(Tata Mcgraw-Hill)
9.Fundamental of microprosessor and Microcomputer - B. Ram 6th Edition

FIRST SEMESTER
Professional Communication in English
Subject Code - MCA105

Max Marks : 100 **Min Marks : 40**

UNIT – I Grammar:
Comprehension of unseen passage, Determiners, Subject, Verb, Concord, Tenses, Question Tags, Voice, Narration, Preposition, Correction of sentences, Paragraph writing.

UNIT – II Communication:
Definition, Process, Elements, Objectives of Communication, Different Medias of Communication, Verbal and Non-verbal Communication, Principles of communication, Barriers to Communication and How to overcome them, Communication in an Organization : Listening-Introduction, Advantages and Importance, Barriers in effective listening, How to become a good listener.

UNIT – III Letter Writing:
Types of letters, Elements of letters, Styles of letter writing, Basics of official correspondence, Preparation of Resume and job application, Quotation, Orders, Sales letter, Tender, Handling correspondence, Advertising and job description.

UNIT – IV Report Writing:
Characteristics of report, Elements of report, Preparation and writing of report, Use of illustrations in reports, Technical report writing, Preparation of Bibliography and References, Note taking and Note making.

UNIT – V Precise writing:
Meetings (Notice, Agenda and Minutes writing techniques) Preparation for Presentation, Conferences and Seminars, Interviews, Techniques of effective speech and interpersonal communication, Business and Technical proposals.

BOOKS RECOMMENDED:

1. Business Correspondence and Report Writing-RC Sharma and Krishna Mohan, Tata McGraw-Hill 2005
2. Developing Communication Skills- Krishna Mohan and Meera Banerjee, McMillan India Ltd.New Delhi, 2000.
3 .Essentials of Business Communication-Rajjendra Pal and J S Korlahalli, Sultan Chand and Sons,2005.
4. Effective Technical Communication-M Ashraf Rizvi , Tata McGraw-Hill Company Limited New Delhi,2005 5. Introduction to Communication Studies-John Fisk, Rotledge London, !990
6. Living English Structure-W.Stannard Allen, Orient Longman London Fourth edition, 1959
7. A Remedial English Grammar for Foreign Students-F T Wood Mac-Millan India Ltd
8. Writing Technical Papers- D H Menzel, H M Jonest, McGraw Hill, 1961.
9. Business Communication-AshaKaul, Prentice Hall, New Jersey, !987

03-8-2018

SCHEME OF TEACHING AND EXAMINATIONS 2018-2019
MASTER OF COMPUTER APPLICATIONS

SECOND SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+(T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA201	Programming in Python	3	2	-	4	100	25	-	125	40	15	-	55
MCA202	Data Structure and Algorithms	3	2	-	4	100	25	-	125	40	15	-	55
MCA203	Analysis of Numerical Methods	3	2	-	4	100	25	-	125	40	15	-	55
MCA204	Operating Systems	3	2	-	4	100	25	-	125	40	15	-	55
MCA205	Financial Management & Accountancy	3	2	-	4	100	25	-	125	40	15	-	55
MCA206	Programming Lab	-	-	3x2	3	-	50	100	150	-	30	50	80
MCA207	Programming Practice / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA208	Common Software / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA209	Personality Development / Mock Interviews	-	-	2	1	-	25	-	25	-	15	-	15
	TOTAL	15	10	12	26	500	300	200	**1000**	200	180	100	**480**

03-08-2018

SECOND SEMESTER
Programming in Python
Subject Code - MCA201

Max. Marks: 100 **Min Marks : 40**

UNIT – I:

Introduction to Python Programming: What is a Program, Formal and Natural Languages, Why use Python, Uses of python, Strengths & Drawbacks, The Python Interpreter,Running Python, The Interactive Prompt, The IDLE User Interface, Dynamic Typing , Debugging.

Types, Operators, Expressions & Statements: Values and Types, Assignment Statement, Variable Names, Expressions & Statements, Script Mode, Order of Operations, String Operations, Comments;

UNIT – II:

Functions: Function Calls, Math Functions, Composition, Adding New Functions, Definitions & Uses, Flow of Execution, Parameters and Arguments, Why Functions, Stack Diagrams, Void and Fruitful Functions, Return Values, Incremental Development, Composition, Boolean Functions, Checking Types.

Recursion: Stack Diagram for Recursive Functions, Infinite Recursion, Taking Input from Keyboard, More Recursion.

UNIT - III:

Conditionals: Boolean Expressions, Logical operators, Conditional & Alternative Execution, Chained and Nested Conditions.

Iterations: Reassignment, Updating Variables, The while statement, break.

Strings: String is a sequence, len, Traversal with a for loop, String Slices, Searching, Looping and Counting, String Methods, The 'in' operator, String Comparison.

UNIT - IV:

Lists: List is a Sequence, Traversing and other Operations, List Slices, List Methods, Map Fiter and Reduce, Deleting Elements, Lists and Strings, Objects and Values, Aliasing, List Arguments.

Dictionaries: A Mapping and as a Collection of Counters, Looping and Dictionaries, Reverse Lookup, Dictionaries and Lists, Memos, Global Variables.

Tuples: Tuple Assignments, Tuples as Return Values, Variable Length Argument Tuples, Lists and Tuples, Dictionaries and Tuples, Sequence of Sequences.

UNIT - V:

Files and Object-Oriented Programming: Files & Persistence, Reading and Writing, Format Operator, Filenames and Paths.

Miscellaneous Topics: Catching Exceptions, Databases, Pickling, Pipes, Modules.

Classes and Objects: Programmer defined Types, Attributes, Instances as Return Values, Classes and Functions, Classes and Methods, Inheritance.

BOOKS RECOMMENDED

1. **Think Python** 2nd Edition, *Allen B. Downey*, O'Reilly Publications
2. **Learning Python** 5th Edition, *Mark Lutz*, O'Reilly Publications
3. **Beginning Python: Using Python 2.6 and Python 3.1**, *James Payne*, Wiley
4. **Python Essentials Reference**, 4th Edition, *David M. Beazley*, Addison – Wesley
5. **Practical Programming: An Introduction to Computer Science Using Python 3**, *Paul Gries et al.*, Pragmatic Programmers

03-08-2016

SECOND SEMESTER
Data Structure and Algorithms
Subject Code - MCA202

Max. Marks: 100 **Min Marks : 40**

UNIT – I Array and Linked Lists
Introduction to data structure, Primitive data structure, Introduction to Algorithm analysis for time and space requirement, Rate of growth and Order notation, Basic time and space analysis of an algorithm.Linear Array, Representations of Array in Memory, Traversing, Insertion and Deletion in Linear Array, Multidimensional Array. Linked list, Representation of linked lists in memory, Traversing a linked list, Searching a linked list, Memory Allocation, Insertion into a linked List, Deletion from a Linked List, Header Linked List, Two- Way Linked Lists, Circular Linked List.

UNIT – II Stack and Queues
Stacks Definition, concepts, operation and application of Stacks, Recursion and Polish notations, Quick sort, tower of Hanoi, Queue, Priority Queue: definition concepts, operation and application of Queue, circular queue and Dequeue.Linked representation of stack and queue.

UNIT – III Trees and Its Representation:
Terminologies related to trees, Binary Tree, complete binary tree, almost complete binary tree; Tree Traversals-preorder, in order and post order traversals, their recursive and non-recursive implementations, Expression tree-evaluation, Linked representations of binary tree, operations. header nodes; threads, **Binary Search Tree:** searching,Inserting and deleting in BST, Heap;Path Lengths; Huffman's Algorithms.Basic idea of AVL Tree.

UNIT – IV Graphs:
Related definitions; Graph representations- adjacency matrix, adjacency list, adjacency multi-list; Traversal schemes - depth first search, breadth first search; Minimum spanning tree; Shortest path algorithm; Kruskal and Dijkstra's algorithms.

UNIT – V Searching, Hashing and Sorting:
Searching : Linear Search, Binary Search, Searching and data modification Hashing- Basics, methods, collision, resolution of collision, chaining; Internal Sorting, External sorting - Bubble Sort, Insertion Sort, Selection Sort, Merge sort, Radix sort, heap sort.

BOOKS RECOMMENDED

1. Data Structures and Program Design in C, Kruse R.L, PHI.
2. Data Structures using C and C++, Tanenbaum, PHI.
3. Data Structures, Schaum Series.
4. Fundamental of Data Structures, Horowitz and Sahani, Galgotia Publishers.
5. Data Structures, Bhagat Singh.
6. Data Structures - Trembley and Sorenson.

03-'18-211 M

SECOND SEMESTER
Analysis of Numerical Methods
Subject Code - MCA203

Max. Marks: 100 **Min Marks : 40**

Simple/Scientific calculators are allowed.

UNIT – I:Solution of Algebraic and Transcendental Equations

Introduction: basic Properties of equations, Solution of Cubic & Biquadrate Equation, Complex roots of polynomial equations, Rate of convergence.

Bracketing Methods:Bisection method, method of False-position.

Open Method: Newton-Raphson method.

UNIT – II:MatricesandSolution ofSimultaneous Algebraic Equations

Matrix: basics, characteristics equation, Eigen vectors,*Eigen values:* power method, ***Inverse of a matrix***:Gauss-Jordan method, Partitioning method.

Direct Methods: Cramer's rules, Matrix inversion method, Gauss Elimination method, Gauss-Jordan method, LU Decomposition, Cholesky's method,

Iterative Method: Jacobi's iteration method, Gauss-Seidaliteration method.

UNIT - III:Empirical Laws and Curve-Fitting

Empirical Laws Basics: Laws reducible to the linear law, Laws containing three constants,

Polynomial curve-fitting:Graphical method, Method of group averages, Method of Least Squares.

Interpolation: Forward and Backward differential operators, ***Finite Differences***for evenly spaced data,***Divided Differences*** for unevenly spaced data,Newton's, Gauss and Langrage's form of interpolation and Divided Differences.

UNIT - IV:Numerical Differentiation and Integration

Numerical Differentiation: Newton's Forward & BackwardFormulae for Derivatives**Newton-Cotes QuadratureFormula**: Trapezoidal Rule, Simpson's Rule ($1/3^{rd}$ and $3/8^{th}$ rule), Boole's Rule, Weddle Rule. Gauss-Legendre's Integration Formula.

UNIT - V: Numerical Solution of Ordinary Differential Equations

Basics: Picard's method, Taylor's Series.

One Step Method: Euler's Method,Runga-Kutta Method (3^{rd} and 4^{th} order),

***Predictor-Corrector Method*:**Milne's method.

BOOKS RECOMMENDED

1.Numerical methods: Dr. B. S. Garewal, Khanna Publishers.

2. Numerical methods for Engineers: Chapra and Canale, McGraw Hill Education.

3. Numerical Analysis: Dr. H. K. Pathak, Shiksha.

4. Numerical Methods: Gupta &Mallic.

5. Numerical methods for scientist & EngineersHamming R.W., McGraw Hill.

6. Elementary numerical analysis:Conle S.D.,Carl De Boor, International Book Company London.

7. Numerical methods for Science and Engineering Calculations:Jain M.K. Iyengar S.R.K, John Willey & Sons.

03-08-2018

SECOND SEMESTER
Operating Systems
Subject Code - MCA204

Max. Marks: 100 **Min Marks : 40**

UNIT - I: Introduction

Defining operating system, History and Evolution of operating system, **Basic Concepts:** batch processing, spooling, multiprogramming, multiprocessor system, time sharing, real time systems, Functions and Goals of operating system, Operating system as resource manager, Operating system as an abstract machine.

UNIT - II: Processor Management

Process concept, Process Control Block, **Process State**: State Transition Diagram, **Scheduling Queues**: Queuing Diagram, Types of schedulers-context switching and dispatcher, various types of CPU scheduling algorithms and their evaluation, multilevel queues and multilevel feedback queues, Thread life cycle, multithreading,

UNIT - III: IPC and Dead Locks

Inter Process Communication: competing and co-operating processes, Introduction to concurrent processing, Precedence graphs, Critical section problem, Semaphore concept, Study of classical process synchronization problems: Producer–Consumer, Dining Philosophers.

Deadlocks: The dead lock problem, dead lock definition, **Deadlock Characterization:** necessary condition, resource allocation graph, **Deadlocks handling**: Deadlock prevention, Deadlock avoidance, Banker's algorithm, Deadlock detection, Recovery from Deadlock.

UNIT - IV: Memory Management

Preliminaries of memory management, Contiguous memory allocation, partitioned allocation MFT, fragmentation, MVT, partition allocation policies, compaction, Non-Contiguous memory allocation, Paging, Structure of page table, Segmentation, **Virtual Memory**: Concepts, demand paging, Swapping, **Page replacement policies**: FIFO, Optimal, LRU, MRU, Thrashing.

Secondary Storage:Hierarchy, physical characteristics, evaluation of disk access time and data transfer rate,**Scheduling algorithms**: FCFS, SCAN etc.

UNIT – V: File and Device Management

File concept: file types, file directory maintenance, File sharing, Basic file system structure, access methods-sequential and direct access, free space management contiguous, linked allocation and indexed allocation and their performances.

Protection and Security: principle of protection, domain structure, access matrix, access control, the security problems.

Distributed systems: Introduction& Features, Types of distributed OS.

BOOKS RECOMMENDED:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne (Wiley India Edition)
2. Modern Operating System, Andrew .S. Tanenbaum, (PHI)
3. Operating System Concepts, James L. Peterson and Abraham Silberschatz (Addison-Wesley)
4. Operating System Concepts & Design, Milan Milenkovic (MGH)
5. An Introduction to Operating Systems, Harvey M. Dietel(Addison Wesley)

03-8-2018

SECOND SEMESTER
Financial Management & Accountancy
Subject Code - MCA205

Max. Marks: 100 **Min Marks : 40**

UNIT - I

1. Financial Accounting

Meaning and Nature, Accounting Principles underlying the preparation of financial statements.

2. Preparation of Financial Statements

A Synoptic view-Profit and Loss account, Balance Sheet

UNIT - II

3. Financial statement Analysis

Ratio analysis (Liquidity, Solvency, Profitability, Efficiency), Statement of Changes in financial position-working capital basis.

4. Conceptual Framework of Cost Accounting

Meaning nature and need of cost accounting, Elements of cost, Preparation of cost – sheet, Cost concept –Fixed and variable costs, sunk costs, Out of pocket costs, Relevant and irrelevant costs, Opportunity and imputed costs.

UNIT - III

5. Cost – volume Profit (CVP) relationship

Break-even analysis; (single and multiple products), Determination of sales volume to attain desired profits, Cash break-even point. Graphic presentation of CVP relationship. Assumptions and limitation of break-even analysis.

UNIT - IV

6. Budgeting

Definition and objective. Preparation of various types of budgets including cash budget. Fixed and flexible budgets.

UNIT – V

7. Cost Accumulation System

Job and Process (simple treatment)

8 Variable and absorption costing systems

Comparison for income determination (simple treatment), Variable costing as a tool of decision-making

BOOKS RECOMMENDED :

1. Accounting for Management - Bhattacharya S.K. and Deardan John
2. The essence of financial accounting - Chadwick

03-8-2015

SCHEME OF TEACHING AND EXAMINATIONS
MASTER OF COMPUTER APPLICATIONS

THIRD SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+(T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA301	Programming in VB & VC++	3	2	-	4	100	25	-	125	40	15	-	55
MCA302	Computer Network & Data Communication	3	2	-	4	100	25	-	125	40	15	-	55
MCA303	Operation Research	3	2	-	4	100	25	-	125	40	15	-	55
MCA304	A.I. & Expert System	3	2	-	4	100	25	-	125	40	15	-	55
MCA305	System Analysis Design & MIS	3	2	-	4	100	25	-	125	40	15	-	55
MCA306	Programming Lab VB/VC++	-	-	3x2	3	-	50	100	150	-	30	50	80
MCA307	Programming Practice / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA308	Common Software / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA309	Seminar	-	-	2	1	-	25	-	25	-	15	-	15
	TOTAL	15	10	12	26	500	300	200	**1000**	200	180	100	**480**

THIRD SEMESTER : MCA - 301
Programming in VB & VC++

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Introduction to Visual Basic : Windows and DOS; hardware; windows, icons and menus; Event Driven Programming; terminology; the working screen; controls and events; the menu systems; the programming language.

Designing and Creating Programs : Program Design; the launch program; the form and the controls; writing the code; save your work; running and testing; making an EXE file; printouts.
Program Flow : Logical testing; branching with if; Select Case; Go To; For...Next; Do Loops; While... Wend.

UNIT - II

Interacting with user : Msg boxes, the input box function, scroll bars, frames, options, check boxes, menus and various components. (Like timer, dbgrid, dbcombo, msflex Grid, etc)
Testing and Debugging : Errors and error spotting, debugging tools, break points and watches, keeping watch, stapping through, error trapping.
Graphics : Objects and properties for drawing, the drawing methods, working with imported graphics, animation.

UNIT - III

Procedures, Functions and Forms : Procedures and Functions, creating a procedures, creating a function, recursive functions, multiple forms (MDI), startup forms, starting from sub main, transferring between forms, procedures and modules.
Arrays : Dimensions, elements and subscripts, arrays and loops, control arrays, creating a control arrays.
Sequential Files : Saving data to files, basic filing, data analysis and file, the extended text editor.

UNIT - IV

Records and Random Access Files : Record structures, random access files, the staff database, design and coding, MDI Forms - parent and child.
Accessing Data - Data Manager and Data Control : Creating database, what is database, planning your database, using the data manager, adding an index, using the data manager to enter data, creating a form with data aware controls, what is data control, what are data aware controls, creating a menu bar.
ADO & RDO controls and introduction to ActiveX control

UNIT – V : Visual C++

Introduction to VC++- C under windows, Overview of VC++, VC++ workspace & projects, creating source code file, adding C++ code to a program.
Introduction to MFC - The part of VC++ programs, the application object, the main window object, the view object, the document object, Windows event oriented programming, What is device context., Windows Application using MFC.
OLE (object linking and embedding technique), Features of OLE, introduction to ActiveX controls, introduction to COM and DLL.

BOOKS RECOMMENDED :

1. Programming in Visual Basic - SAHU By BPB Publications.
2. Unreleased Visual Basic Guide

VC++

1. The complete Reference VC++ : Chris H.Pappas & William H.Murray, Tata McGraw
2. Visual C++ in Record time : Steven Holzner
3. Visual C++ Programming : Yashwant P. Kanetkar

THIRD SEMESTER : MCA - 302
Computer Networks And Data communication

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I

Introduction to Computer Networking : The Concept of Networking, Data Communication, Required network elements, The role of Standards Organization. Line Configuration, Various Topologies, Transmission Mode, Categories of Networks- LAN, MAN, WAN. The benefits of a Computer Networks.

The OSI and TCP/IP Reference Model : The Concept of Layered Architecture, Design Issues for the Layers. Interfaces and services, Detailed Functions of the Layers. Comparison between OSI and TCP/IP Reference model.

UNIT - II

Transmission of Digital Data : Shannon's and Nyquist theorems for maximum data rate of a channel. Transmission media- Co-axial, UTP, Fiber optic and wireless. Analog and digital data Transmission- parallel and serial transmission. DTE-DCE interface using RS-232C. Study of modems- 56k and Cable Modem. Modem standards.

Multiplexing and Switching : The Concept of Multiplexing- FDM, TDM, WDM. The Concept of Switching- Circuiting, Message switching, Packet switching.

UNIT - III

Data Link Layer and Routing Algorithms : Line Discipline, Flow Control- stop and wait, sliding window, Go back N, Error Control- ARQ stop and wait, sliding window ARQ. HDLC, SLIP, PPP. Multiple access protocols- ALOHA, Slotted ALOHA, CSMA/CD. IEEE standards for LAN's and MAN's. The IP protocol, and its header. IP address classes and subnet mask.

The concept of ICMP, ARP, RARP, RSVP, CIDR and Ipv6. : Routing algorithms- shorted path first, Distance Vector, Link State. Congestion Control-The leaky bucket and Token bucket Algorithms.

UNIT - IV

Transport Layer : The Concept of client and Server in terms of Socket addressing in Transport layer. Two way and three-way handshaking. TCP header.
Network Performance Issues. The Concept of Domain Name System, Various Resource Records. Architecture and services of E-mail (RFC-822 and MIME). The Concept of WorldWide Web- server side and client side.

ATM : The concept of ATM, ATM Adoption layers- AAL1, AAL2, AAL3/4, AAL5, Comparison of AAL protocols. Cell formats for UNI and NNI. Service Categories, Quality of service, Congestion Control in ATM.

UNIT - V

Comparative study of Networking Technologies : X.25, Frame Relay, ATM, SONET, SMDS, ISDN.

Network Security : The Importance of Security in Networking. Traditional Cryptography, Data Encryption Standards, RSA algorithm.

BOOKS RECOMMENDED :

1. Computer Networks - A S Tanenbaum
2. Data Communication and Networking - Forouzan

THIRD SEMESTER : MCA - 303
Operation Research

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I

Linear Programming -

L P formulations, Graphical method for solving LP's with 2 variables, Simplex method, Duality theory in linear programming and applications, Special Linear Programming Problems, Transportation Problem (Stepping Stone Method), Assignment problem (Hungarian Method)

UNIT - II

Network Analysis -

Examples of network flow problems, Shortest –route problems, Dijkstras Algorithm, Applications of shortest – route problems, Max flow problem, Flow network, Labeling routine, Labeling algorithm for the max flow problems, Min-cut and max –cut theorem.

UNIT - III

Project Scheduling by PERT/CPM -

Project management origin and the use of PERT origin and use of CPM, Application of Pert and cpm; Project network - Diagram representation, Critical path calculations by linear programs, Critical path calculations by network analysis and critical path method (cpm), Determinations of floats, Constructions of time chart and resource labeling, Project cost curve and crashing in project management, Program evaluation and Review technique (pert).

UNIT - IV

Dynamic Programming -

Basic concepts - Bellman's optimality principles, Examples of D.P. models and computations. Examples to be taken from Different areas of allocations, replacement, sequencing, and scheduling, networks and other related O>R areas.

Queuing Models -

Notations and assumptions, Queuing models with Poisson input and Exponential Service,(M/M/1): (∞/FIFO), (M/M/1) : (∞/SIRO), (M/M/1):(N/FIFO), Birth-Death Model, (M/M/C) : (N/FIFO) (M/M/C) : (C/FIFO)), Power Supply Model.

UNIT - V

Sequencing Models -

Sequencing Problem, Johnson's algorithm for processing n jobs through 2 machines, Johnson's Algorithm for processing n jobs through 3 machines, Processing 2 jobs through n machines, graphical solution.

Inventory Models -

Introduction to the inventory problem, Deterministic models - The classical EOQ (Economic Order Quantity) model, Non- zero lead time, The EOQ with shortages allowed.

BOOKS RECOMMENDED:

1. Operation Research : By Giltte.
2. Operation Research : Gupta and Kumar.
3. Operation Research : Gupta and Manmohan.

03-8-2012

THIRD SEMESTER : MCA - 304
Artificial Intelligence And Expert Systems

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I

General Issues and overview of AI :
The AI problems; what is an AI technique; Characteristics of AI applications.

Problem solving, search and control strategies :
General problem solving; production systems; control strategies: forward and backward and backward chaining Exhaustive searches: Depth first Breadth first search.

UNIT - II

Heuristic Search techniques :
Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/Or Graphs; problem reduction and AO* algorithm; constraint satisfaction problems.

Game playing :
Minimax search procedure; Alpha-Beta cutoffs; Additional Refinements.

UNIT - III

Knowledge Representation :
First order predicate calculus; Skolemization Resolution principle and unification; Inference Mechanisms; Horn's clauses; semantic Networks; frame systems and value inheritance. Scripts; conceptual dependency.

AI Programming Languages :
Introduction to Lisp, Syntax and Numeric functions; List manipulation functions; Iteration and Recursion; Property list and Arrays, Introduction to PROLOG.

UNIT - IV

Natural language processing :
Parsing technique; context—context- free grammar; Recursive Transition Nets (RTN); Augmented Transition Nets ((ATN); case and logic grammars; semantic analysis.

Planning :
Overview- An example Domain: The Blocks Word; Component of planning systems: Goal Stack Planning (linear planning); Non-linear planning using goal sets; probabilistic reasoning and Uncertainty; probability theory; Bayes Theorem and Bayesian networks; certainty factor.

UNIT - V

Expert Systems :
Introduction to expert systems and Applications of expert systems; various expert system shells: vidwan; frame work; knowledge acquisition; case studies; MYCIN.

Learning :
Role learning; learning by induction; Explanation based learning.

BOOKS RECOMMENDED :

1. Elaine Rich and Kevin knight: Artificial Intelligence-Tata McGraw hill.
2. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems. Prentice hall of India.
3. Nills j. Nilson: Principles of Artificial Intelligence; Narosa publishing house.
4. Clocksin & C.S. Melish ; Programming in PROLOG – Narosa publishing house.
5. M.sasikumar ,S.Ramani. etc : Rule based expert system (A practical Introduction) narosa publishing house.

05-5-2018

THIRD SEMESTER : MCA - 305

System Analysis Design & MIS

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I

Introduction : Systems Concepts and the information systems environment - Definition of system, Characteristics of system, elements of system, types of system, The system Development life cycle : consideration of candidates system. The Role of system Analyst - Introduction, the multiphase role of the analyst, the analyst / user interface, the place of the analyst in the MIS Organization.

UNIT - II

System Analysis and its Tools :

System Planning and initial investigation : basis for planning in systems analysis, fact finding, fact analysis, Feasibility study. Information Gathering Tools & technique, System Planning and initial investigation : basis for planning in systems analysis, fact finding, fact analysis, Feasibility study. Information Gathering Tools & technique, Structured Analysis, DFD, Data Dictionary, Decision Tree, Decision Table. Cost-benefit Analysis.

UNIT – III

System Design : The process of Design Methodologies, Audit Consideration. Input Design, Output Design, Form Design, File Structure, Database structure.

System Implementation -

System Testing, the test plan, quality assurance, data processing auditor. Conversion, Post Implementation review, Software Maintenance. Computer Industry, the software Industry, A procedure for Hardware Software Selection, Project scheduling & Software. System Security, disaster/recovery planning, ethics in system development.

UNIT - IV

Introduction to MIS : Definition of MIS, Benefits of MIS, Function of MIS, Characteristics of MIS, Operating Elements of Information System, Components of Information System, Three Dimension of Information System; MIS and Other Subsystems – Information Generator, Information System Levels, Open and Closed Loop System, MIS Organizations, Types of Information System, Establishing MIS. Introduction of Transaction Processing Systems.

UNIT - V

The strategic impact of the internet and E-commerce : About internet, an overview of internet Application. Business uses of Internet, Electronic marketing and on-line communities of worldwide web.

Information Technology Assets : Managing Hardware Assets, Managing Software Assets, Managing Data Resources, MIS and Decision Support System, Strategic Information System.

RECOMMENDED BOOKS –

1. System Analysis and Design – M. Awad
2. System Analysis and Design – V. Rajaraman
3. Management Information System – D.P.Goyal

MCA-307 DATA COMMUNICATION AND NETWORKING

1. Running the Diagnostic utility for NIC provided with the Driver Floppy/CD.
2. Demonstration of UTP Flat and Cross Cable Crimping.
3. Configuration of Windows 98 Peer-to-Peer Networking.
4. Installation of Windows 2000 server along with Common Software Installations.
5. Concept of Active Directory and DNS with their Configuration in Windows 2000.
6. User and Group Administration in Windows 2000 Server.
7. Implementation of NTFS File and Folder permission and Security.
8. Windows 2000 Server as a DHCP Server Installation and Configuration.
9. Windows 2000 Server as a WINS Server Installation and Configuration.
10. Implementation of Monitoring Tools.
11. Interconnectivity with Windows 98, Linux 8.0.
12. Implementation of Terminal Services on Windows 2000 Server.
13. Installation of Oracle 8i on 2000 Server and Network Client on WIN98 and Connectivity between them.

03-08-2018

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SCHEME OF TEACHING AND EXAMINATIONS
MASTER OF COMPUTER APPLICATIONS

FOURTH SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+(T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA401	Programming in Java	3	2	-	4	100	25	-	125	40	15	-	55
MCA402	Software Engineering	3	2	-	4	100	25	-	125	40	15	-	55
MCA403	Interactive Computer Graphics	3	2	-	4	100	25	-	125	40	15	-	55
MCA404	Unix / Linux	3	2	-	4	100	25	-	125	40	15	-	55
MCA405	Elective : 1. Compiler Designing 2. Advanced Computer Architecture	3	2	-	4	100	25	-	125	40	15	-	55
MCA406	Programming Lab JAVA	-	-	3x2	3	-	50	100	150	-	30	50	80
MCA407	Programming Practice / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA408	Common Software / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA409	Seminar	-	-	2	1	-	25	-	25	-	15	-	15
	TOTAL	15	10	12	26	500	300	200	**1000**	200	180	100	**480**

23-8-2018

FOURTH SEMESTER – MCA401
Programming in JAVA

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I : Introduction to java programming

An overview of Java: Object Oriented Programming, Features of Java, Java Virtual Machine, Java Environment: Java Development Kit, Java Standard Library, Data Types, Variables: Declaring a variable, Dynamic Initialization, The scope and life time of variable, Type conversion and Casting: Narrowing and Widening Conversions, Numeric Promotions, Type Conversion Contexts; Operators: Arithmetic Operators, Relational Operators, Logical Operators, Bit wise Operators, Conditional Operators, new operator, [ ] and instance of operator. Control Statements: Java's Selection statement, Iteration Statement, Jump Statement, Array: Declaring Array variables, Constructing an Array, Initializing an Array, Multidimensional Arrays, Anonymous Arrays.

UNIT - II : Define the Class and interface

Introducing Classes: Class Fundamentals, Declaring Object, Assigning Object Reference Variables, Defining Methods, method overloading, Using objects as parameter, Constructors, Garbage collection, finalize () method. Inheritance: Inheritance basic, method overloading, object reference this and super, Chaining constructor using this () and super (), Member accessibility modifier: public, protected, default accessibility of member, private protected, private, Package: Define package, CLASSPATH, importing package, Interface: Define an interface, implementing interface, extending interface, variable in interface, Overview of nested class: Top level nested class and interface, Non static inner class, Local class, Anonymous class.

UNIT - III : Exception handling and Multithreading

Exception Handling: Exception types, Uncaught Exception, Using try and catch, multiple catch, nested try block, throw, and throws, finally.

Multithreading: creating thread, Thread priority, synchronization, thread Scheduler, Running & yielding, sleeping and waking up, waiting and notifying, suspend and resume, miscellaneous method in thread class.

UNIT - IV : Input output, Networking and Fundamental class of java

Object class, String class, String Buffer class, Wrapper class, Math class, Collection: Collection interface, List interface, Set interface sorted interface, Array List class, Liked List class, Tree Set, Comparator, Vector, Stack.

Input output classes and interface: File, Buffer Stream, Character Stream, and Random Access for files, Object Sterilization.

Networking: Socket overview, Client/Server, Proxy Server, Network class and interface, TCP/IP client socket, TCP/IP Server socket, URL Connection, Datagrams, Datagram Packets.

UNIT - V : Applet programming and AWT

Applet : Applet and Application program, Creating Applets, Applet Life Cycle, Applet and Thread, Supplying Applet parameter, Using Images and Sound in Applets, JAR files, Applet Security.

Introducing the AWT : Overview of the java.awt package, Component and Containers: Component, Container, Panel, Applet, Window, Frame, and Dialog classes. Working with Graphics, Working with Fonts, Working with Colors. *GUI Control Components* : Button, Canvas, Checkbox and Checkbox Group, Choice, List, Label, Scrollbar, Text Field and Text Area, Frame, Menu Bars and Menu. *Layout Management*: Layout Management Policies, Flow Layout, Grid Layout, Border Layout, Card Layout, Grid Bag Layout, Customized Layout.

Event Handling: Overview of Event Handling, Event Hierarchy, Event Delegation Model, Event Adapters, Low Level Event Processing.

BOOKS RECOMMENDED :

1. The Complete Reference Java 2 - Herbert Schildt, Publisher- TMH
2. A Programmer Guide to Java - Khlid A. Mughal, R.W. Rasmussen.
3. Introduction to HTML by - Kamlesh N. Agarwala, O.P.Vyas, P A. Agarwala.
4. Web Enabled Commercial Application Java 2 - Ivan Bayross Publisher- B.P.B.

03-8-2015

FOURTH SEMESTER : MCA - 402
Software Engineering

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Software Engineering Fundamentals :

Definition of software product; types of Software; introduction to Software Engineering; Need of Software Engineering; Software Crisis; Software Engineering principles (Layers); Software Engineering problems; SDLC; Waterfall Model, Prototype Model, Incremental Model, Spiral Model, RAD Model; Role of management in software development (4P).

UNIT - II

Software Analysis and Design:

software requirements specification (SRS); Structure of SRS; Requirement Engineering; Analysis Model-Data Flow Diagram, Data Dictionary, E-R Diagram, Decision Table, Pseudocode, Software Design, Design Objectives, Strategy of Design, Abstraction, Partitioning and Projection, Process Oriented Design (Gane, Sarson and Yourdon), Data Oriented Design(Warnier-orr), Object Oriented Design (Booch Method), Cohesion and Coupling.

UNIT - III

Software Quality and Case Tools :

Software Matrices, Categories of Matrices, Software quality assurance, McCall's Quality factors, Software Maturity model, ISO Model, Software Reliability, case tools and its scope, Architecture of case tools, case objectives, case classification, categories of case tools, cyclomatic complexity.

UNIT - IV

Coding and Testing :

Choice of Programming Languages; Coding Style; Structured Programming; Coding Standard; Internal Document; Software Testing-Verification and Validation; Testing Techniques -white box, black box; Levels of Testing - Unit, integration, validation and system; Test Plan; Debugging - Debugging Process, Error, Fault and Failure.

UNIT - V

Software Maintenance and Project Management :

Introduction to Maintenance; Categories of Maintenance; Belady and Lehman Model, Boehm Model, Software Project Team; Software Project Planning; Project monitoring and controls; Software Project Estimation, Cost Estimation Model (COCOMO Putnam-slim, Watson and fellix).

RECOMENDED BOOKS:

1. Software Engineering: A Practitioner's Approach – by Essman Roger, Tata McGraw Hill
2. An Integrated approach to Software Engineering - by Jalote Pankaj, Narosa: New delhi. 1991.
3. Software Engineering, An Integrated Approach – By S.M.Ghosh.
4. Software Engineering – By Bahrat Bhushan Agrawal.
5. Software Engineering – By K.K. Agraw

FOURTH SEMESTER : MCA - 403
Interactive Computer Graphics

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I : Display Devices

Refresh Cathode ray tubes, Random Scan and raster Scan Monitors, Direct view storage tubes, continual refresh and storage display, plasma panel displays, LED & LCD devices, color display techniques, shadow marking and penetration, hard copy devices-printer and plotters.

UNIT - II : Output Primitives

Points and Lines, Line drawing algorithms - vecgen and Bresenham Antialiasing. Circle generating Algorithms, Bresenham Circle Algorithms Ellipse, Character generating and text display. Matrix and Stork fonts, output command for various geometrical shapes, fill areas horizontal scan for Polygons. Attribute of outputs primitives, line style, text style, bundled attributes, fill colors and patterns Program in Java or c++ for related Algorithms.

UNIT - III : Display Description

Word/user coordinates, device coordinate, normalized device coordinates, two dimensional viewing. Transformation - Translation, scaling rotation, reflection, shearing. Matrix representation of transformation and homogenous coordinates, Concatenation of transformation. Viewing algorithms- windows and viewpoints, windowing and clipping, line, area text clipping, blanking windows to view point transformation zooming and planning. Segment, concepts and file, segment attributes.

UNIT - IV : Interactive Graphics

Physical Input devices, logical classification, interactive picture construction techniques, input function.

3-D Transformation

Translation, Scaling, Rotation about standard and arbitrary axis, transformation commands.

UNIT - V : 3-D Projection

Viewing Pipeline, Viewing transformation and clipping, Normalized view volume, viewing Pipeline, hidden line and surface elimination algorithms backface removal, depth buffer method, scan line method, depth sorting method, area subdivision and octree method.

Design for User Interface

Components and user model, command language, memorization user help, backup and error handling, response time, command language style, menu design, feedback, output formats. Development of graphics in Matlab

RECOMMENDED BOOKS :

1. Computer Graphics - Hearn D. & Baker P.M.
2. Computer Graphics : A Programming Approach - Harringron S.
3. Procedural Elements for Computer Graphics - Rogers D.F.

FOURTH SEMESTER : MCA – 404
Unix / Linux

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I

Introduction : Introduction to Multi-user System, Emergency and history of Unix, Feature and benefits, Versions of Unix. **System Structure:**-Hardware requirements, Kernel and its function, introduction to System calls and Shell.

File System : Feature of Unix File System, Concept of i-node table, links, commonly used commands like who, pwd, cd, mkdir, rm, ls, mv, lp, chmod, cp, grep, sed, awk, pr, lex, yacc, make, etc. Getting started (login / logout), File system management, file operation, system calls, buffer cache **.Vi Editor:**-Intro to text processing, command and edit mode, invoking vi, command structure, deleting and inserting line, deleting and replacing character, searching strings, yanking, running shell command, command macros, set windows, set auto indent, set number, intro to exrc file.

UNIT - II

Shell Programming : Introduction to shell feature, wild card characters, i/out redirections, standard error redirection, system and user created shell variables, profile files, pipes/tee, background processing, command line arguments, command substitution, read statement, conditional execution of commands, special shell variables $ #, #?, $* etc. Shift commands, loops and decision making- for, while and until, choice making using case...esac, decision making if ....fi, using test, string comparison, numerical comparison, logical operation, using expr.

UNIT - III

Introduction to Shell : Features, changing the login shell, cshrc, login, logout files, setting environment, variables, history and alias mechanism, command line arguments, redirection/appending safely, noclobber, noglob, ignore eof, directory stacks (pushd, popd), feature of other shell (rsh, vsh).

Process Control : Process management, process states and transition, regions and control of process, sleep and waking, process creation, process killing, signals, system boot and init process, traps, sitting process priorities.

UNIT - IV

Inter-process Communication : I/O Sub system, terminal drives, disk drives, messages, shared memory, semaphores, memory management, swapping, demand paging.

System Calls and Unix -C Interface : File handling calls like - access (), open(), create(), read(), write(), close(), fseek(), process control system calls like kill(), exec(), fork(), wait(), signal(), exit(), comparing stdio library and calls.

UNIT - V

System Administration : Process and Scheduling, Security, Basic System Administration:- Adding a User, User Passwords, Delete of a User, Adding a Group, Deleting a Group, Super User, Startup and Shutdown. Advanced System Administration:-Managing Disk Space, Backup and Restore, Managing System Services. Xwindows:- Introduction to Xwindows concept.

BOOKS RECOMMENDED :

1. Design of Unix Operating System - Maurice Bach
2. Advanced Unix - Stephan Prata
3. The Unix Programming Environment - Kennighan and Pike
4. Unix Programmers Guide - P. P. Selvester
5. Introduction to Unix System - Rachell Morgan
6. Complete Reference Red Hat Linux - Richard Peterson
7. Complete Reference Unix

FOURTH SEMESTER : MCA – 405

Elective – 1 : Compiler Design

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I

Introduction to Compiling and one pass compiler :
Compilers & translators, Phases of compilers, Compiler writing tools, Bootstrapping; overview of one pass compiler.

Finite Automata and Lexical Analysis –
Role of Lexical Analyzer; specification of tokens, Recognition of tokens, Regular expression, Finite automata, from regular expression to finite automata, DFA and NFA, Implementation of lexical analyzer; tools for lexical analyzer -LEX.

UNIT - II

Syntax analysis & Parsing Technique -
Context free grammars; Bottom up parsing, Shift reduce parsing, Operator Precedence parsing, Top down parsing, elimination of left recursion; recursive descent parsing, Predictive parsing.

Automatic Construction of Efficient parsers –
LR parser, construction of SLR and canonical LR parser table, Using ambiguous grammar, An automatic parser the generator, YACC, Using YACC with ambiguous grammar, creating YACC lexical analyzer with LEX, Error recovery in YACC.

UNIT - III

Syntax Directed Translation –
Syntax directed schema, Construction of syntax tree, Translation with top down parser.

Run Time Environment –
Source Language issues, Storage organization and allocation strategies, Parameter passing, Implementation of block-structured language.

UNIT - IV

Intermediate Code Generation –
Intermediate languages; Postfix notation, Three-address code, Quadruples and triples, Translation of assignment statements, Boolean expression, and Procedure call.

Error Detection & recovery –
Lexical & syntactic phase error, semantics error.

UNIT - V

Code Optimization –
Optimization of basic block, Loop optimization global data flow analysis, Loop in variant computation.

Code Generation –
Issue and design of code generator, the target machine, a simple code generator.

BOOKS RECOMMENDED :

1 Principles of Compiler Designing - **by Alfred V. Aho and J.D. Ullman.**
2.Principles of Compiler-Principles, Technique and Tools - **Alfred V. Aho, Ravi Sethi**

FOURTH SEMESTER : MCA – 405
Elective – 2 : Advanced Computer Architecture

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT I:

Introdution - Feng's and Flynn's classification scheme, Multiprocessor and Multicomputer, UMA, NUMA, COMA, NORMA, memory models, parallel computer and its type. Applications of Parallel Computers.

UNIT II:

System Interconnect Architecture – Static and Dynamic, Hypercube Interconnection network, multistage interconnection networks-architecture and routin, design consideration, throughput delay, blocking and non-blocking properties. Performance Metrics and Benchmarks.

UNIT III:

Principle of pipelining-overlapped parallelism, Linear and non-linear pipelining, reservation table, calculation of MAL. Types of Instruction Pipeline. Arithmetic pipeline designs example –Floating point adder, pipelined multiplier.

UNIT IV:

Advanced processor Technology – RISC, CISC, VLIW architectures, Hazard detection and resolution, case study of CRAY 1.

UNIT V:

Exploring parallelism in program- multidimensional arrays. Parallel Algorithm-Matrix addition, subtraction, multiplication –block and SIMD. Bitonic sort, sorting on linear array processors. Bernstein's condition, iso efficiency concept.

Text Books:

1 Computer Architecture & Parallel Processing by Kai Hwang and F.A. Briggs-Mc Graw Hill.
2 Advanced Computer Architecture By Kai Hwang –Mc Graw Hill.
3 Parallel Computing by M.R. Bhujade – New Age Publication.

Reference Books:

Parallel Computing Theory and practice by Michael J. Quinn –Tata Mc-Graw Hillal & Yogesh Singh.

03-8-2010

SCHEME OF TEACHING AND EXAMINATIONS
MASTER OF COMPUTER APPLICATIONS

FIFTH SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+(T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA501	Advanced Programming Tools - **Java**	3	2	-	4	100	25	-	125	40	15	-	55
MCA502	Introduction to .Net Technology & C#	3	2	-	4	100	25	-	125	40	15	-	55
MCA503	Data Mining and Data Warehouse	3	2	-	4	100	25	-	125	40	15	-	55
MCA504	Electives : 1. **Soft Computing** 2.Simulation & Modeling 3.OOAD 4.Introduction to I SO & CMM	3	2	-	4	100	25	-	125	40	15	-	55
MCA505	Electives : **Satellite & Mobile Communication** 1. Embedded Programming 2. Robotics 3. Artificial Neural Network & fuzzy logic	3	2	-	4	100	25	-	125	40	15	-	55
MCA506	Programming Lab	-	-	3x2	3	-	50	100	150	-	30	50	80
MCA507	Programming Practice / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA508	Common Software / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
MCA509	Seminar	-	-	2	1	-	25	-	25	-	15	-	15
	TOTAL	15	10	20	26	500	300	200	**1000**	200	180	100	**480**

23-8-2006

FIFTH SEMESTER : MCA – 501
Advanced Programming Tools – JAVA

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I : JDBC

Introduction to JDBC, JDBC Drivers Type, Connection, JDBC URLs, Driver Manager, Statement – Creating, Executing, Closing, Result Set – Data Types and Conversions. Prepared Statement, Callable Statement, Mapping SQL and Java Types, JDBC-ODBC Bridge Driver

UNIT - II : RMI

Distributed Applications, Introduction to RMI, Java RMI Architecture, Writing an RMI Server, Designing a Remote Interface, Implementing a Remote Interface, Creating a Client Program, Compiling the Programs, Running the Programs

UNIT - III : Servlets

Movement to Server Side JAVA, Overview of Servlets, Common Gateway Interface (CGI), The JAVA Servlet Architecture, Generic Servlet and HTTP Servlet, The Servlet Interface, Requests and Responses, The Life Cycle of a Servlet, Retrieving Form Data in a Servlet, Session Tracking, Cookies.

UNIT - IV : Java Beans

Java Beans Concepts and the Beans Development Kit, Using the Bean Box, Writing a Simple Bean, Properties, Manipulating Events in the BeanBox, The BeanInfo Interface, Bean Customization, Bean Persistence.

UNIT - V : Java Server Pages (JSP) & J2ME

Overview of JSP, JSP Scripting elements, Compare and Contrast JSP with CGI and Servlet Technologies, List JSP directives, Integrate JSP with Java Beans Components, Handle JSP exceptions, Develop a basic Java Server Pages, Deploy Java Server Pages, Compare two-tier and multi-tier web application architectures, Database Connectivity. Introduction of J2ME, Variable declaration and syntax, Application, documentation and implementation of Java apps.

Text Books

1. The Complete Reference Java 2 (Updated to Cover J2SE 1.4) - Herbert Schildt, Tata McGraw-Hill publishing company Ltd. New Delhi, India.
2. Core Java 2 Volume-I Fundamentals - Cay S. Horstmann Gary Cornell, PEARSON Education, Singapore Pte. Ltd., Indian Branch, New Delhi, India 2005.

Reference Books

1. Java 2 for Professionals Developers - Michael Morgan, SAMS, Techmedia, New Delhi, India 2000.
2. Thinking in Java, The Definitive Introduction to Object-Oriented Programming in the Language of World-Wide-Web - Bruce Echel, PEARSON Education, Singapore Pte. Ltd., Indian Branch, New Delhi, India 2005.
3. Java 2 Developer's Hand Book - Philip Heller and Simon Roberts,BPB Publication, New Delhi

03-8-2011

FIFTH SEMESTER : MCA – 502

Introduction to .NET Technology

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I : Inside the .NET framework :

Overview of .net framework, Managed Execution process, CLR, common language specification, JIT Compilation , MSIL, Namespaces, Assemblies, metadata, Common Type System, cross language, interoperability, Garbage collection.

UNIT - II : Programming with .NET Framework

Windows form : working with Visual Studio IDE, creating a .NET solution, MDI application, components and controls, Data types, variables, Type conversions, Operators, Control Structures : conditional statements, loops, arrays, types of methods, method data, Introduction to exception handling-exception statements.

UNIT - III : XML, Windows process and File Handling

Types, structures, Enumerations, classes, Interfaces, Working with files-Files and directories, streams, Readers and writers, Reading and writing XML files, XML serialization, processing Transaction, Monitoring and Managing Windows Process, retrieving information about process.

UNIT - IV : Building .NET Framework Applications

Introduction to ASP .NET, Differentiate classic ASP and ASP .NET, Web application, Web forms, Form validations – Client side, Server side, controls in web forms, Events in Web form.

UNIT - V : Advanced concepts and Database Programming

Delegates, ADO .NET Architecture, .NET dtat provider, dataset components, creating database applications using Window forms and web forms (Database connectivity through ADO .NET), Introduction to web services, web services for Mobile application, Remote overview.

BOOKS RECOMMENDED

1. MSDN online – by Microsoft
2. Visual Basic .NET Complete - By BPB Publications, New Delhi.
3. The Complete Reference VB .NET – By Jeffery R. Shapiro, Tata Mcgraw Hill.
4. Professional VB .NET 2003 – by bill Evjen & others, Wiley Dreamtech India (P) Ltd. New Delhi.

03-8-2011

FIFTH SEMESTER : MCA – 503
Data Mining & Data Warehousing

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I : Introduction & Data Warehousing and OLAP Technology for Data Mining –
What is data mining?, Data Mining: On what kind of data?, Data mining functionality, Are all the patterns interesting?, Classification of data mining systems, What is a data warehouse?, A multi-dimensional data model, Data warehouse architecture, Data warehouse implementation, Further development of data cube technology, From data warehousing to data mining. Concept of Transaction, Transactional database, Distributed Database, Commit Protocols.

UNIT - II : Data Preprocessing, Data Mining Primitive, Languages and System Architecture –
Why preprocess the data?, Data cleaning ,Data integration and transformation, Data reduction, Discrimination and concept hierarchy generation, Data Mining Primitive, Data Mining Query Language, Architecture of data mining system.

UNIT - III : Mining Association Rules in Large Databases-
Association rule mining, Mining single-dimensional Boolean association rules from transactional databases, Mining multilevel association rules from transactional databases, Mining multidimensional association rules from transactional databases and data warehouse, From association mining to correlation analysis, Constraint-based association mining.

UNIT - IV : Classification and Prediction & Cluster Analysis –
What is classification? What is prediction? Issues regarding classification and prediction, Classification by decision tree induction, Bayesian Classification, Classification by back propagation, Classification based on concepts from association rule mining, Other Classification Methods ,Prediction, Classification accuracy, What is Cluster Analysis?, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

UNIT - V : Mining Complex Types of Data & Applications and Trends in Data Mining -
Multidimensional analysis and descriptive mining of complex data objects, Mining spatial databases, Mining multimedia databases, Mining time-series and sequence data, Mining text databases, Mining the World-Wide Web, Data mining applications, Data mining system products and research prototypes, Additional themes on data mining, Social impact of data mining, Trends in data mining.

BOOKS RECOMMENDED

1. Data Mining: Concepts and Techniques - Jiawei Han and Micheline Kamber
2. Data Mining Concepts - H. Marget
3 . Introduction to Data Mining- -Pang – Ning Tan, Michael Steinbach, Vipin Kumar

03-08-2016

FIFTH SEMESTER : MCA – 504
Elective 1 : : Soft Computing

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I : Introduction to Fuzzy Logic System

Fuzzy Sets Operation Of Fuzzy Sets, Properties Of Fuzzy Sets, Fuzzy Relations, Fuzzy Arithmetic, Membership Functions, Fuzzy To Crisp Conversion. Fuzzy Logic, Fuzzy Rule Based Systems, Fuzzy Decision Making, Fuzzy Database, Fuzzy Intelligent System.

UNIT - II : Introduction to Artificial Neural Networks

Introduction to Artificial Neural Network, Artificial Neuron, Classification of Artificial Neural Network, Architecture of a Artificial Neural Network, Activation Function, Training an Artificial Neural Network, Application of Artificial Neural Network.

UNIT - III : Perceptron and Associative Memories

Amari General Learning Rule, HEBB Learning Rule, ADLINE, Perceptron Layer Network, Associative memory: Auto associative Memory, Bi-directional memory, Back-propagation Network: Architecture, Training Algorithm Application of Back-propagation algorithm

UNIT - IV : Machine Learning

Regression And Classification, Decision Tree, SPRINT, Gini Index, Entropy, Pruning, C4.5, Active Learning - Feature Selection, Clustering, Models And Methods, Neural Networks, Markov Chain/Processes, Hidden Markov Models (HMM).

UNIT - V : Soft Computing Tools

Introduction to MATLAB, Features, Matrix Operations, Curve Plotting, Toolbox Introduction, Introduction to Simulink.

RECOMMENDED BOOKS:

1. Fuzzy systems and Fuzzy Logic, Klir and Uuna, PHI Publications.
2. Introduction to Artificial Neural Networks, S. N. Sivanandam and M. Paulraj, Vikas publication.
3. Neural Network Design by Hagan & Demuth, Vikas Pub. Comp.
4. Fundamentals of Artificial Neural Networks, M.A.Hassaoun.
5. Fuzzy sets, uncertainty and information George J. Kir, & TA Folger.
6. Fuzzy sets, Decision making and Expert system, HJ Zimmerman, Kluwer, Boston.
7. Fuzzy set theory and its applications, H. J. Zimmerman, Kluwer, Boston.

03-8-2017

FIFTH SEMESTER : MCA – 505

Elective 1 : Satellite & Mobile Communication

Max Marks : 100 **Min Marks : 40**

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I : Introduction.

Introduction to Mobile Communication, Short history of wireless communication, Applications, Vehicles, Emergency, Business, Replacement of wired network, Location dependent services, infotainment, Mobile and Wireless devices, A Simplified reference model, some open research topics in mobile communication.

UNIT - II : Satellite Systems

History of satellite system, Applications of satellite systems, Type of satellite systems, characteristics of satellite systems, satellite system infrastructure, satellite system architecture, Global Positioning system (GPS), Limitations of GPS. Beneficiaries of GPS, Applications of GPS

UNIT - III : Mobile Communication Systems

Introduction, Cellular System Infrastructure,, Registration, Handoff Parameters and Underlying support, Roaming Support Using System Backbone, to Mobile IP, Functions of Mobile IP, Mobile Node, Corresponding Node, Home Network, Foreign Network, Home Agent , Foreign Agent, Care-of Address, IP Packet Delivery, Agent Discovery, Agent Solicitation , Registration, Tunneling , Dynamic host configuration protocol.

UNIT - IV : Wireless LANs and PANs

Introduction to IEEE 802.11, Ricochet, Ricochet Wireless Modem, Services Provided by Ricochet , Home RF, Home RF Technology, Hiper LAN, Blue tooth , Advantages and disadvantages of Wireless LAN, Infra red vs radio transmission , introduction to MAC. Technologies influence WLANs / WPANs in future.

UNIT - V : Mobile Adhoc Network

Introduction to Mobile Adhoc Network(MANET), Characteristics of MANET, Applications of MANET, Routing, Need for Routing, Routing Classification, Table-Driven Routing Protocol – Destination Sequenced Distance Vector Routing Protocol, Cluster-Head Gateway Switch Routing, Wireless Routing Protocol. Source initiated On-demand Routing- Adhoc On Demand Distance Vector Routing, Dynamic Source Routing, Temporarily Ordered Routing Algorithms, Hybrib Protocol – Zone Routing Protocol.

RECOMMENDED BOOKS :

1. Mobile Communication: Jochen H. Schiller, Pearson Education Publication
2. Introduction to Wireless and Mobile Systems: D.P. Agrawal , Qing-An Zing , Vikas Publishing House

03-08-2018

SCHEME OF TEACHING AND EXAMINATIONS
MASTER OF COMPUTER APPLICATIONS

SIXTH SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+(T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Sessional Marks of Project Work	Project Viva-Voce	Pr	Total	Sessional Marks of Project Work	Project Viva-Voce	Pr	Total
MCA601	System Development Project (System Design & Implementation)	5	-	30	20	200	200	-	400	120	100	-	220
	TOTAL	5	-	30	20	200	200	-	400	120	100	-	220

Note : Major Project will include Research Project as well during which candidate may publish Research Paper.