

**Post Graduate Department of Computer Sciences,
The University of Kashmir,
Srinagar - 190006**



**Proposed
Credit Based Choice Based Curriculum
for**

**Master of Computer Applications
(MCA) Programme
2014 – 2016**

MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Structure of CBCS (3 Credit) Curriculum for MCA

1st Semester

Core:

- i. MCA-101-CR: Programming Concepts in C / C++
- ii. MCA-102-CR: Database Systems
- iii. MCA-103-CR: Lab for C/C++
- iv. MCA-104-CR: Lab for Database Systems

Electives: (any 4)

Any one of these

- i. MCA-105-EA: Discrete Mathematics
- ii. MCA-106-EA: Linear Algebra

Any three of these

- iii. MCA-107-EA: Computer Fundamentals and Applications
- iv. MCA-108-EA: Technical Communication
- v. MCA-109-EA: Computer Architecture
- vi. MCA-110-EA: Programming Languages
- vii. MCA-111-EO: Open elective (To be selected from outside department)
- viii. MCA-112-EO: Open elective (Offered for students from outside department)

2nd Semester

Core:

- i. MCA-201-CR: Data and File Structures
- ii. MCA-202-CR: Numerical and Statistical Computing
- iii. MCA-203-CR: Lab for Data Structure
- iv. MCA-204-CR: Lab for Numerical and Statistical Computing

Electives: (any 4)

- i. MCA-205-EA: Advance Computer Architecture
- ii. MCA-206-EA: Data Communication
- iii. MCA-207-EA: Operating Systems
- iv. MCA-208-EA: Optimization Techniques
- v. MCA-209-EA: Management Information System
- vi. MCA-210-EO: Open elective (To be selected from outside department)
- vii. MCA-211-EO: Open elective(Offered for students from outside department)

3rd Semester

Core:

- i. MCA-301-CR: Design and Analysis of Algorithms(DAA)
- ii. MCA-302-CR: Artificial Intelligence
- iii. MCA-303-CR: Lab for DAA
- iv. MCA-304-CR: Lab for Artificial Intelligence (through Mat lab)

Electives: (any 4)

- i. MCA-305-EA: Modeling & Simulation
- ii. MCA-306-EA: Object Oriented Modeling Analysis and Design
- iii. MCA-307-EA: Data Mining
- iv. MCA-308-EA: Computer Networks
- v. MCA-309-EA: e-Commerce
- vi. MCA-310-EO: Open elective (To be selected from outside department)
- vii. MCA-311-EO: Open elective(Offered for students from outside department)

4th Semester

Core:

- i. MCA-401-CR: Software Engineering
- ii. MCA-402-CR: Computer Graphics
- iii. MCA-403-CR: Lab for Software Engineering
- iv. MCA-404-CR: Lab for Computer Graphics

To be effective from the year 2014

MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Electives: (any 4)

- i. MCA-405-EA: Unix/Linux Programming
- ii. MCA-406-EA: Theory of Computation & Formal Languages
- iii. MCA-407-EA: Pervasive Computing
- iv. MCA-408-EA: Advanced Software Engineering
- viii. MCA-409-EA: Image processing
- ix. MCA-410-EA: Machine Learning
- x. MCA-411-EO: Open elective (To be selected from outside department)
- xi. MCA-412-EO: Open elective(Offered for students from outside department)

5th Semester

Core:

- i. MCA-501-CR: Java Programming
- ii. MCA-502-CR: System Programming
- iii. MCA-503-CR: Lab for Java Programming
- iv. MCA-504-CR: Lab for System Programming

Electives:(any 4)

(Any one of the following)

- i. MCA-505-EA: Minor Project (Research Topics[Software Engineering]) / Minor Project (Research Topics[Artificial Intelligence]) / Minor Project (Research Topics[Computer networks]) / Minor Project (Research Topics[Database Systems]) / Minor Project (Software Development)

(Any three of the following)

- ii. MCA-506-EA: Software Project Management
- iii. MCA-507-EA: Compiler construction
- iv. MCA-508-EA: C# programming
- v. MCA-509-EA: Wireless communication
- vi. MCA-510-EA: Bio-Informatics
- vii. MCA-511-EO: Open elective (To be selected from outside department)

6th Semester

Core:

- i. MCA-601-CR SRS, Analysis and Design
- ii. MCA-602-CR Software Testing
- iii. MCA-603-CR Software Project Demonstration
- iv. MCA-604-CR Software Project Dissertation

Electives:(any 4)

- v. MCA-605-EA Oracle Database Management 1 and 2
- vi. MCA-606-EA Dot Net Technologies
- vii. MCA-607-EA Advanced Java Programming
- viii. MCA-608-EA Organization Behavior and Personal Management
- ix. MCA-609-EA Research Methodology
- x. MCA-610-EA Research Dissertation
- xi. MCA-611-EO Open elective (To be selected from outside department)

Open Courses for students from outside

Note:

The Department offers three courses MCA, MSc-IT and PGDCA. Open course course for students from outside department is shown as part of MCA scheme and structure only.

1st Semester

MCA-112-EO: Computer Foundations

2nd Semester

MCA-211-EO: Programming Concepts

3rd Semester

MCA-311-EO: Learning Mat lab

4th Semester

MCA-412-EO: Learning SPSS

Structure of CBCS (3 Credit) Curriculum for MCA

Semester-I						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA-101-CR	Programming Concepts in C / C++	Core	3	0	0	3
MCA-102-CR	Database Systems	Core	3	0	0	3
MCA-103-CR	Lab for C/C++	Core	0	0	6	3
MCA-104-CR	Lab for Database Systems	Core	0	0	6	3
MCA-105-EA	Discrete Mathematics	Elective (Allied)	3	0	0	3
MCA-106-EA	Linear Algebra	Elective (Allied)	3	0	0	3
MCA-107-EA	Computer Fundamentals and Applications	Elective (Allied)	3	0	0	3
MCA-108-EA	Technical Communication	Elective (Allied)	3	0	0	3
MCA-109-EA	Computer Architecture	Elective (Allied)	3	0	0	3
MCA-110-EA	Programming Languages	Elective (Allied)	3	0	0	3
MCA-111-EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
MCA-112-EO	Open elective (Offered for students from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

Semester-II						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA-201-CR	Data and File Structures	Core	3	0	0	3
MCA-202-CR	Numerical and Statistical Computing	Core	3	0	0	3
MCA-203-CR	Lab for Data Structure	Core	0	0	6	3
MCA-204-CR	Lab for Numerical and Statistical Computing	Core	0	0	6	3
MCA-205-EA	Advance Computer Architecture	Elective (Allied)	3	0	0	3
MCA-206-EA	Data Communication	Elective (Allied)	3	0	0	3
MCA-207-EA	Operating Systems	Elective (Allied)	3	0	0	3
MCA-208-EA	Optimization Techniques	Elective (Allied)	3	0	0	3
MCA-209-EA	Management Information System	Elective (Allied)	3	0	0	3
MCA-210-EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
MCA-211-EO	Open elective (Offered for students from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Semester-III						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA-301-CR	Design and Analysis of Algorithms DAA	Core	3	0	0	3
MCA-302-CR	Artificial Intelligence	Core	3	0	0	3
MCA-303-CR	Lab for DAA	Core	0	0	6	3
MCA-304-CR	Lab for Artificial Intelligence (through Mat lab)	Core	0	0	6	3
MCA-305-EA	Modeling & Simulation	Elective (Allied)	3	0	0	3
MCA-306-EA	Object Oriented Modeling Analysis and Design	Elective (Allied)	3	0	0	3
MCA-307-EA	Data Mining	Elective (Allied)	3	0	0	3
MCA-308-EA	Computer Networks	Elective (Allied)	3	0	0	3
MCA-309-EA	e-Commerce	Elective (Allied)	3	0	0	3
MCA-310-EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
MCA-311-EO	Open elective (Offered for students from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

Semester-IV						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA-401-CR	Software Engineering	Core	3	0	0	3
MCA-402-CR	Computer Graphics	Core	3	0	0	3
MCA-403-CR	Lab for Software Engineering	Core	0	0	6	3
MCA-404-CR	Lab for Computer Graphics	Core	0	0	6	3
MCA-405-EA	Advanced Unix/Linux Programming	Elective (Allied)	3	0	0	3
MCA-406-EA	Theory of Computation & Formal Languages	Elective (Allied)	3	0	0	3
MCA-407-EA	Pervasive Computing	Elective (Allied)	3	0	0	3
MCA-408-EA	Advanced Software Engineering	Elective (Allied)	3	0	0	3
MCA-409-EA	Image processing	Elective (Allied)	3	0	0	3
MCA-410-EA	Machine Learning	Elective (Allied)	3	0	0	3
MCA-411-EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
MCA-412-EO	Open elective (Offered for students from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

To be effective from the year 2014

MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Semester-V						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA-501-CR	Java Programming	Core	3	0	0	3
MCA-502-CR	System Programming	Core	3	0	0	3
MCA-503-CR	Lab for Java Programming	Core	0	0	6	3
MCA-504-CR	Lab for System Programming	Core	0	0	6	3
MCA-505-EA	Minor Project (Research Topics[Topic1 or Topic 2 or Topic 3 or Topic 4])/ (Software Development)	Elective (Allied)	3	0	0	3
MCA-506-EA	Software Project Management	Elective (Allied)	3	0	0	3
MCA-507-EA	Compiler construction	Elective (Allied)	3	0	0	3
MCA-508-EA	C# Programming	Elective (Allied)	3	0	0	3
MCA-509-EA	Wireless communication	Elective (Allied)	3	0	0	3
MCA-510-EA	Bio-Informatics	Elective (Allied)	3	0	0	3
MCA-511-EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

Semester-VI						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA-601-CR	SRS, Analysis and Design	Core	3	0	0	3
MCA-602-CR	Software Testing	Core	3	0	0	3
MCA-603-CR	Software Project Demonstration	Core	0	0	6	3
MCA-604-CR	Software Project Dissertation	Core	0	0	6	3
MCA-605-EA	Oracle Fundamentals 1 and 2	Elective (Allied)	3	0	0	3
MCA-606-EA	Dot Net Technologies	Elective (Allied)	3	0	0	3
MCA-607-EA	Advanced Java Programming	Elective (Allied)	3	0	0	3
MCA-608-EA	Organization Behavior and Personal Management	Elective (Allied)	3	0	0	3
MCA-609-EA	Research Methodology	Elective (Allied)	3	0	0	3
MCA-610-EA	Research Dissertation	Elective (Allied)	0	0	6	3
MCA-611-EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

To be effective from the year 2014

Note : This revised syllabus shall be implemented from the academic session 2014 as follows :-

- **1st and 2nd Semester - Academic Session 2014**
- **3rd and 4th Semester - Academic Session 2015**
- **5th and 6th Semester – Academic Session 2016**

Semester - I

Course No: – MCA-101-CR
Course Title: Programming Concepts Using C / C++

Unit I

Arrays: Declaration; initialization; 2-dimensional and 3-dimensional array, passing array to function, strings and string functions, and character arrays.

Pointers: variables, swapping data, swapping address v/s data, misuse of address operators, pointers and arrays , pointers to pointers , strings , pointer arithmetic, additional operators , portability, pointers to functions, using pointers with arrays , void pointers .

Structures and unions: syntax and use, members, structures as function arguments, structure pointers, array of structures as arguments, passing array of structure members, call by reference.

Unit II:

Functions; prototype, passing parameters, storage classes, identifier visibility, Recursive functions. Command-line arguments. Scope rules, Multi-file programming, Introduction to macros.

File processing in C and C++.

Introduction to graphics, graphic initialization, graphic modes, drivers, basic drawing functions, Animations- concept and implementation, Building graphical user interface.

Unit III

Introduction to classes and objects; Constructor; destructor; Operator overloading; Function overloading; function overriding; friend function; copy constructor;

Inheritance,: Single , Multiple, and Multilevel Inheritance;

Virtual function and Polymorphism: Dynamic binding, Static binding; Virtual functions; Pure virtual function; concrete implementation of virtual functions; Dynamic binding call mechanism; Implementation of polymorphism; virtual destructors.

Unit IV

Templates: Function Templates, Class Templates, Member Function Template and Template Arguments, Exception Handling, Standard Template Library

Reference Books:1.

1. FOSTER AND FOSTER “C by discovery” RRI penram.
2. YASHWANT KANETKAR “Let us C” PHI.
3. E. BALAGURUSWAMI “Programming in ANSI C” Tata McGraw Hill.
4. BJARNE STROUSTRUP “The C++ programming language” Pearson Education.
5. HERBERT SCHILD “C++ The complete Reference” Tata McGraw Hill.
6. ROBERT LAFORE “Object orientation with C++ Programming” Waite Group.

Course No: – MCA-102-CR
Course Title: Database Systems

Unit I

Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Architecture, Data Mining and Information Retrieval, Database Models and Comparison, Relation Algebra, ER Model, CODDS Rules, Normalization..

Unit II

Introduction to SQL, Data Types, Data Definition Language, Data Manipulation Language, Transaction Control Language, Integrity Constraints, SQL Functions, Set Operators and Joins, View, Synonym and Index, Sub Queries and Database Objects, Locks and SQL Formatting Commands.

Unit III

Introduction to PLSQL, Architecture, Data Types, Control Structures, Concept of Error Handling, Cursors and Database Triggers, Subprograms and Packages.

Unit IV

Data Storage and Querying using various storage structures, Indexing and Hashing, Query Processing and Optimization. Transaction Management Concepts, Concurrency Control and Recovery.

Reference Books:

William Page, "Using Oracle 9i – Special Edition", Que/PHI.

Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 6th edition, 1997, McGraw-Hill, International Edition.

Ivan Bayross, "SQL & PL/SQL Using Oracle 8i & 9i with SQLJ", BPB.

Desai.B , "An introduction to Database Concepts", Galgotia Publications, N.Delhi

1. Dates.C , " An introduction to Database Systems", Pearson Education, Asia

Course No: MCA-105-EA
Course Title: Discrete Mathematics

UNIT I

Proposition, Logic, Truth tables, Propositional Equivalence, Logical Equivalence, Predicates and Quantifiers, Sets: operations on sets, Computer representation of sets, Functions: Domain, Range, One-to-One, Onto, Inverses and Composition, Cardinality of a Set, sequences and summations, The growth of functions . Methods of Proof: Different methods of proof, Direct Proof, Indirect Proof, Mathematical Induction for proving algorithms.

UNIT II

Counting: Basic Counting Principle, The Pigeon-Hole Principle, Permutation, combinations, repetitions, discrete probability, Advanced Counting Techniques: Inclusion-Exclusion, Applications of inclusion-exclusion principle, recurrence relations, solving recurrence relation. Relations: Relations and their properties, Binary Relations, Equivalence relations, Digraphs, Matrix representation of relations and digraphs, Computer representation of relations and digraphs, Transitive Closures, Warshall's Algorithm.

UNIT III

Partially Ordered Sets (Posets), External elements of partially ordered sets, Hasse diagram of partially ordered set, isomorphic ordered set ,Lattices: Properties of Lattices, complemented Lattices. Graph theory: Introduction to graphs, Graph Terminology Weighted graphs, Representing Graphs, Connectivity of Graphs: Paths and Circuits, Eulerian and Hamiltonian Paths, Matrix representation of graphs. Graph Coloring.

UNIT IV

Trees: Rooted trees, Application of trees: Binary Search Trees, Decision Trees, Prefix Codes, Tree traversal, trees and sorting, spanning trees, minimal spanning trees.

Finite Boolean algebra, Functions on Boolean algebra, Boolean functions as Boolean polynomials. Groups and applications: Subgroups, Semigroups, Monoids, Product and quotients of algebraic structures, Isomorphism, Homomorphism,

TextBook :

KENNETH H. ROSEN “Discrete Mathematics and Its Applications” The Random House/Birkhauser Mathematics series

Reference Books:

1. LIU “Elements of Discrete Mathematics “ Tata McGraw Hill
2. SCHAUMS “Discrete Mathematics “ Tata McGraw Hill
3. KOLMAN/REHMAN “Discrete Mathematical Structures “ Pearson Education
4. NICODEMI “Discrete Mathematics “ CBS

Course No: MCA-106-EA
Course Title: Linear Algebra

UNIT-I

Systems of Linear Equations. Matrices. Matrix Multiplication. Algebraic Properties of Matrix Operations. Special Types of Matrices and Partitioned Matrices. Echelon Form of a Matrix. Solving Linear Systems. Elementary Matrices. Finding The Inverse of a Matrix. Equivalent Matrices. Determinants. Properties of Determinants. Cofactor Expansion. Inverse of a Matrix (via its determinant). Other Applications of Determinants (Cramer's rule).

UNIT-II

Vectors in The Plane and in 3-Space. Vector Spaces. Subspaces. Span and Linear Independence. Basis and Dimension. Homogeneous Systems. Coordinates and Isomorphism. Rank of a Matrix. Inner Product Spaces. Gram-Schmidt Process. Orthogonal Complements.

UNIT-III

Linear Transformations and Matrices. Kernel and Range of a Linear Transformation. Matrix of a Linear Transformation. Similarity. Transformations Sparse Matrices and Iterative Methods

UNIT-IV

Eigenvalues and Eigenvectors. Diagonalization and Similar Matrices Diagonalization of Symmetric Matrices. Markov Matrices. Complex Matrices and FFTs Numerical Linear Algebra

References:

1. SERGE LANG : Introduction to Linear Algebra, Springer Verlag.
2. S. KUMARESAN : Linear Algebra A Geometric approach, Prentice Hall of India Private Limited.
3. M. ARTIN : Algebra, Prentice Hall of India Private Limited.
4. K. HOFFMAN and R. KUNZE : Linear Algebra, Tata McGraw Hill, New Delhi.
5. GILBERT STRANG : Linear Algebra and its applications, International Student Edition.
6. L. SMITH : Linear Algebra, Springer Verlag.
7. A. RAMACHANDRA RAO and P. BHIMA SANKARAN : Linear Algebra, Tata McGraw Hill, New Delhi.
8. T. BANCHOFF and J. WERMER : Linear Algebra through Geometry, Springer Verlag New York, 1984.
9. SHELDON AXLER : Linear Algebra done right, Springer Verlag, New York.
10. KLAUS JANICH : Linear Algebra.
11. OTTO BRETCHER : Linear Algebra with Applications, Pearson Education.
12. GARETH WILLIAMS : Linear Algebra with Applications, Narosa Publication.

Course No: MCA-107-EA
Course Title: Computer Fundamentals and Applications

Unit-I

Generations of Computers, PC Family of Computers, Different I/O devices; Introduction to Operating System, Overview of Different Operating Systems, Functions of Operating System; Fundamentals of Disk Operating System (DOS), Understanding DOS prompt, Working with DOS commands, Config.sys and Autoexec.bat files.

Unit II

Introduction to Windows, Working with Accessories (Notepad, WordPad and Paint); Personalizing Windows, Installing and Removing Applications; Boot Options & Concept of Registry.

Unit III

Introduction to Office Tools: Word Processing, Advantages of Word Processing, Fundamentals of MS-Word, Working with Menus and Toolbars, Introduction to Macros. Overview of Excel, Working with Cells, Creating Worksheets, Working with Formulae Bar. Introduction to PowerPoint, Creating and Designing Slides, Working with Hyperlinks & Animation.

Unit IV

PC Management: Disc Management Tools, PC tools, Norton utilities, Disk Doctor; Introduction to Computer Security, Viruses, Virus Detection, Prevention & Cure Utilities. Using Internet: Shared Folders; Browsers, E-Mails, Attachments; Search Engines,

Suggested Readings:

1. **Taxali**, PC Software, 2005, **Tata McGraw Hills, New Delhi.**
2. **Suresh K. Basandra** , Computers Today, 2005, **Galgotia Publications.**
3. **P. K. Sinha** , Computer Fundamentals,2005, **BPB, New Delhi.**
4. **Peter Norton**, **Inside the PC, 2001, SAMS Tech Media.**
5. **Sanjay Saxena**, **MS Office for Everyone, 2005, Vikas Publications.**
6. **Peter Dyson**, Understanding PC Tools, **AET Publications.**
7. **Peter Dyson**, Understanding Norton Utilities, **AET Publications.**

Course No: – MCA-108-EA
Course Title: Technical Communication

Unit I

Basics of Technical Communication, Barriers to Communication, Technology in Communication. Communicating in the Workplace: Problem Solving in Workplace Communication, Guidelines for writing with a computer, Human factors in the communication failure, Solving the persuasion problem. Guidelines for ethical communication. Guidelines for organizing a collaborative team, Peer reviewing and editing.

Unit II

Active Listening : Introduction , types of listening, Traits of a good listener , Active versus Passive listening , Implications of a good listening .Introduction to Effective Presentation strategies , Defining purpose , analyzing audience and locale , organizing contents , preparing outline , visual aids , understanding nuances of delivery ,kinesics , proxemics , paralinguistics ,chronemics ,sample speech. Interviews: introduction, Objectives, types of interviews, Job interviews. Group Communication: Introduction, Group discussion, Organizational Group discussions, meetings conferences

Unit III

Words and Phrases , Dictionary and Thesaurus , Elements of style , Sentence construction , guidelines for effectiveness, Paragraph development , Central components of a paragraph , length and techniques for paragraph development.

The art of condensation , steps for effective précis writing , samples and guidelines , Reading comprehension , purpose and reading rate , reading comprehension, reasons for poor comprehension, improving comprehension skills , techniques for good comprehension.

Unit IV

Visual Design and usability elements ,Designing Pages and Documents, Adding a document supplements, testing the usability of your document.

Memo reports and Electronic Mail : Purpose of memo reports , Elements of a usable memo Interpersonal considerations in writing a Memo , Common types of memo report. E-mail , Guidelines for using electronic mail, Letters and Employment correspondence , How applicants are screened for personal qualities , electronic job hunting , guidelines for surviving a job interview , Technical definitions : Purpose , level of detail , expansion methods , Purpose and general model of Technical description ,Elements of usable description .Procedure and processes , Proposal and analytical reports, Recording and documenting research findings.

Reference Books:

1. Meenakshi Raman and Sangeeta Sharma, “Technical Communication”, Oxford University Press
2. William Pfeiffer, Padmaja ”Technical Communication A Practical Approach” , Pearson Education.

Course No: MCA-109-EA
Course Title: Computer Architecture

UNIT I

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic - integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier, carry save multiplier, etc. Division - non-restoring and restoring techniques, floating point arithmetic. Boolean algebra, simplification of Boolean expressions, k-map, tabulation method. Implementation of Boolean functions with logic gates.

UNIT II

Sequential logic , flip - flops , registers , up/down counters , BCD/Binary counters, Analysis and design of synchronous sequential systems, state assignment, races and hazards. Introduction to threshold logic & relay circuits. Introduction to switching devices. Positive and Negative logic of OR, AND, NOR, NAND. Exclusive OR and Exclusive NOR gates. RTL, DTL, DCTL, TTL, RCTL, ECL, HTL, MOS and CMOS logic circuit and their realization. Speed and delay in logic circuit and their realization. Fan-in, Fan-out, wired-or, wired-and, and noise immunity

UNIT III

CPU control unit design: hardwired and micro-programmed design approaches, Case study - design of a simple hypothetical CPU. **Memory system design:** semiconductor memory technologies, memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O transfers - program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes - role of interrupts in process state transitions.

UNIT IV

Performance enhancement techniques

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs block size, mapping functions, replacement algorithms, write policy.

References:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Elsevier.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, McGraw Hill.
3. John P. Hayes, Computer Architecture and Organization, McGraw Hill.
4. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson Education.
5. Vincent P. Heuring and Harry F. Jordan, Computer Systems Design and Architecture, Pearson Education.

Course No: MCA-110-EA

Course Title: Programming Languages

Unit I

The role of Programming Languages: Towards Higher Level Languages programming paradigms, Language implementation. Language Description: Syntactic Structures, Expression Notations, Abstract Syntax trees, Lexical Syntax, Context free grammars , grammars for expression. Imperative Programming: Structured Programming, Syntax directed control flow, Design considerations, handling special cases in loops, programming with invariants, proof rules for partial correctness, control flow in C

Unit II

Data Representation : The role of types , basic types , arrays , records , unions and variant records , Sets , Pointers , Two String tables , types and error checking. Procedure Activations: Introduction to Procedures, parameter passing methods, scope rules for names, nested scope in source text, activation records, lexical scope: procedures as in C

Objected oriented programming : Constructs for program structuring , Information hiding , Program design and modules , modules and defined types , class declarations in C++ , dynamic allocation in C++ , templates : Parameterized types , Implementation of Objects in C++., Inheritance , derived classes and information hiding

Unit III

Functional Programming : Language of expressions , types, values and operations , approaches to expression evaluation , lexical scope , type checking, Function declaration by cases , Functions as first-class values ,Implicit types , data types exception handling , Scheme , a dialect of Lisp , the structure of lists , list manipulation, Simplification of expressions. Logic Programming , Computing with relations , Introduction to Prolog , data structures in Prolog , Programming techniques , controls in Prolog, Cuts

Unit IV

, An introduction to concurrent Programming : Parallelism in hardware , Streams : implicit synchronization , concurrency as interleaving, Liveliness properties , safe accesses to shared data concurrency in ADA .

Language Description : Semantic Methods , Synthesized attributes, Attribute grammars , natural semantics , Denotational Semantics , Equality of Pure Lambda terms , Substitution revisited , Computation with pure lambda terms , programming constructs as lambda terms , the typed lambda calculus , polymorphic types

Reference Books:

1. Ravi Sethi ,“ Programming Languages ,Concepts and Constructs”, Pearson Education
2. Freidman, Wand ,Haynes, ”Essentials of Programming Languages”, PHI.

Semester - II

Course No.: MCA-201-CR
Course Title: Data & File Structures

Unit I

Introduction: Introduction to Data Structure; Primitive and non-primitive data structure; Linear and non-linear data structure; Recursion Function and its examples (Tower of Hanoi etc.). Sparse array and its implementation. String Manipulation; Markov theorem and its applications;

Unit II

Singly and Doubly-Linked Lists, Circular Linked List, their implementation and comparison. Stacks and Queues: their array based and Linked List based Implementation. Applications of Stack (Evaluation of expressions, their conversions).

Unit III

Searching: Sequential and Binary Search , Concept of Hash Functions, Hash-tables and Hashing with Chaining. Sorting Techniques: Insertion Sort, Selection Sort, Quick Sort, Heap Sort. Introduction to external sort

Unit IV

Binary Trees, Binary Search Trees: Searching, Insertion and Deletion of nodes. Height Balance and Concept of AVL Trees. Concept and purpose of B-Trees. Graphs: Definition, Terminology and representation using Adjacency Matrix and linked list. Shortest Path Algorithms and their implementation. Graph Traversals: BFS and DFS Algorithms and their Implementations.

Text Book:

1. Tenenbaun M., “Data Structures Using C And C++”, Pearson Education.
2. Tremblay and Sorenson: “An Introduction to Data Structures with Applications” McGraw Hill, New Delhi, 1976

Reference Books:

1. Horowitz and Sahni: “Fundamentals of Data Structures” Golgotia Publication, 2001.

Course No. MCA-202-CR
Course Title: Numerical and Statistical Computing

UNIT I

Introduction. Requirements for computer-oriented solutions to numerical problems. Approximations & Errors – Types of Programming Errors, Computer & Arithmetic Errors, Accuracy and Precision, Round Off and Truncation Errors. Propagation of Error.

Algorithms to Compute Roots of Equation – Methods of Tabulation or Brute Force Method, Method of Bisection, Secant Method, Newton-Raphson Method, Method for False Position. Implementations of these methods.

UNIT II

Algorithms to Solve Linear Algebraic Equations : Gauss Elimination, Gauss Jordan, Gauss Seidel, L.U. Decomposition, Lagrange Interpolated Polynomial, Newton Divided Differences Interpolating Polynomial. Implementation of these methods.

UNIT III

Algorithms to solve Ordinary Differential Equations – Euler Method and Modification. The trapezoidal Rule, Simpson's Rule. R-K Method. Implementation of these methods.

UNIT IV

Standard Deviation, Correlation, Regression Analysis, Algorithms for Curve Fitting straight line: Least Square Approximation. Concept of Hypothesis, Statistical Tests: Chi-Square Test, Student t-Test, f-Test.

REFERENCE BOOKS:

1. S.C.Chapra & R.P.Canale: “Numerical methods for Engineering”. Tata McGraw Hill.
2. Krishenmurty and Sen : “Numerical Algorithms”
3. V. Rajaraman “Computer oriented numerical methods.” Prentice Hall of India.
4. McCalla, Thomas Richard: “Introduction to Numerical Methods and FORTRAN Programming”, John Wiley & Sons, Inc.
5. Grewal, B. S.: “Higher Engineering Mathematics”, Hindustan Offset Problems Series.
6. “SCHAUM’S Solved Problems Series”.
7. Sharma, K. D.:“Programming in Fortran”.
8. Jain, M. K., Iyengav, S. R. K., Jain, R. K.: “Numerical Methods for Scientific and Engineering Computation”+, Wiley Eastern Ltd, New Delhi.

Course No: MCA-205-EA

Course Title: Advanced Computer Architecture

Unit I

Computational Models : Introduction , Interpretation of the concept of a computational model , Relationship between , the concepts of computational model , programming language and architecture , Basic Computational models , The Von , Neumann computational model ,Key concepts related to computational models , Granularity , typing . The concept of computer architecture : Evolution and interpretation of the concept of Computer Architecture at different levels of abstraction. The concept of computer architecture at multilevel hierarchical framework. Extensions , Description of Computer Architectures.

Unit II

Introduction to Parallel Processing , : Basic Concepts about program , process, thread , process and threads in languages , concurrent and parallel execution , concurrent and parallel programming languages, Types and levels of Parallelism , Classification of Parallel architectures , Basic Parallel Techniques , Relationship between languages and parallel architectures . Introduction to Instruction level Parallel Processors , Evolution and overview , dependencies , instruction scheduling , preserving sequential consistency , the speedup potential of ILP Processing , Pipelined Processors , Basic Concepts , Design space of Pipelines , Pipelined instruction Processing , Pipelined execution of integer and Boolean instructions , Pipelined Processing of loads and stores.

Unit III

VLIW , Basic Principles ,Overview of Proposed and Commercial VLIW , Superscalar processing , introduction , parallel decoding , superscalar instruction issue , shelving , register renaming , parallel execution , preserving the sequential consistency of instruction execution and exception processing ,Implementation of superscalar CISC processor using a superscalar RISC core. Processing of control transfer instructions. The branch problem ,basic approaches . Guarded exception. Code Scheduling of ILP.

Unit IV

Introduction to data-[parallel architectures , connectivity , SIMD Architecture , fine and coarse grained SIMD architectures , Associative and neural architectures ,Data Parallel pipelined and systolic architectures , vector architectures , Introduction to MIMD architectures , Multi threaded architectures , Distributed Memory MIMD architecture , Shared memory MIMD architectures..

Text Book : Advanced Computer Architecture DEZSO SIMA , TERENCE Mountain , PETER KACSUK , Pearson Education, Fifth Indian reprint 2004.

Reference Books :

V.C. Hamacher. A.G. Vranesic and S. G. Zaky: “Computer Organization”, Tata McGraw Hill.

J.P. Hayes: “Computer Architecture and Organization”, McGraw Hill.

Morris Mano: “Computer System Architecture”, Pearson Education ,3/e.

Course No: MCA-206-EA
Course Title : Data Communication

Unit I

Bandwidth and Channel Capacity. Quantifying Channel Capacity for noiseless channel(Nyquist Law) and noisy channel(Shannon's Law). Example of a digital telephone system to explain basic concepts of analog signals, digital signals, sampling. Data Rate versus Baud Rate. Nyquist Criterion for Sampling. Data transmission concepts. Characteristics of signals(amplitude, frequency, period,wavelength, Signal-to-Noise ratio). Key components in data communications systems. Simplified model. Local area network(LAN) concepts and characteristics.

Unit II

Wide area networks(WANs). WAN technologies (traditional packet and circuit switching, Frame Relay, ATM). ISDN(narrowband) concepts and services. Overview of the OSI model. Transmission media – factors affecting distance and data rate. Guided transmission media: Twisted-Pair, Co-axial Cable. Principles and advantages of optical networks. Types of optical fibers and lasers.

Unit III

Unguided transmission media: Terrestrial Microwave & Satellite Microwave systems and applications. Data encoding. Difference between modulation and encoding. NRZ-L, NRZ-I encoding. Multilevel Binary and Biphas Coding techniques and their implementations. ASK,FSK,PSK and QPSK. PCM concepts: sampling, quantization. Delta Modulation. Amplitude Modulation.

Unit IV

Reliable transmission of data: Asynchronous and Synchronous transmission. Error detection: Parity-based, CRC-based. FCS computation. Error control and recovery techniques. Concept of ARQ standard and its versions. Concept of Multiplexing. FDM. Synchronous and Statistical TDM.

Reference Books:

1. William Stallings, "Data and Computer Communications", Pearson Education
2. Andrew Tanenbaum, "Computer Networks", Pearson Education 4/e.
3. Ulysses Black, "Principles of Data Communications ", PHI.
4. Morley, Gelber, "The Emerging Digital Future", Addison-Wesley.

Course No: MCA-207-EA
Course Title : Operating Systems

Unit I

Introduction to Distributed Systems: Goals – Advantages of distributed systems over centralized systems – disadvantages of distributed systems, Hardware & Software Concepts, loosely coupled systems, network operating systems, Network file systems, design Issues –transparency – Flexibility – performance – scalability.

Network and protocols: An introduction to Computer networking , Network technologies , LAN,WAN, Protocols, Technology case study, ATM, The Client – Server Model

Unit II

Remote Procedure Calling: Introduction , Features of RPC, User package, Design issues, Classes of RPC system , Interface definition language, exception handling, delivery guarantees, implementation , interface processing , binding, Locating the binder, RPC in Unix system, Synchronization in Distributed systems: Clock synchronization, Logical Clocks, Physical Clocks, Clock synchronization algorithms, Mutual exclusion, A centralized algorithms,

Unit III

A distributed algorithms, A token ring algorithms, comparison of the three algorithms, Election algorithms, The Bully algorithms, Ring algorithms, Dead Locks in distributed systems, Distributed deadlock detection. Process and Processors in distributed systems: Threads, Introduction, Usage, Design issues for thread packages, An example for thread packages, System models, The workstation model, The processor pool model, The hybrid model , Processor allocation, Allocation models, Design issues, Implementation issues.

Unit IV

Distributed File and Directory Services: Distributed file service requirements, File service components , Flat file service , Directory Service, Client module, Design issues, implementation techniques. Distributed shared memory Introduction: Shared memory, Consistency models, Page based Distributed shared memory, Shared – variable Distributed shared memory, Object based Distributed Shared Memory.

Text Book: Distributed Operating systems, Andrew s.Tanenbanm

Reference Books:

1. Advanced Concepts in Operating Systems, Singhal and Niranjana G.Shivaratna
2. Dietel, H.M. “An introduction to operating system” Pearson Education, 2/e.
3. Milenkovic. M. “An Operating System – Concepts & Design”. McGraw Hill International Education Computer science series 1992.
4. Peterson. J.L.Abharam Silberschatz. “Operating System Concepts”. John wiley ,1989.

Course No: MCA-208-EA
Course Title: Optimization Techniques

Unit I

Linear Programming Problem (LPP): Formulating LPPs, Simplex Algorithm, Big-M Method, Two-Phase Method, Sensitivity Problems. Duality in LPP: Duality Theorems, Dual Simplex Method

Unit II

Transportation Problems: Mathematical Formulation of Transportation problem, Methods of selecting initial basic feasible solution: Matrix minima method, North-West Corner Rule, Vogel's Approximation Method; Unbalanced Transportation Problem; Degeneracy in Transportation Problem and its resolution through MODI Method(U-V Method). Assignment problems: Algorithm, Unbalanced Assignment Problem, Hungarian Method

Unit III

Inventory Models: Inventory problems and their analytical structures, deterministic economical lot size model, Stochastic and deterministic order level system. Game theory: Definition and Terminologies; Pure Strategy: saddle point, Game with two saddle points; Mixed strategies: games without saddle points, $2 \times n$ games, Dominance Property.

Unit IV

Replacement Theory: Replacement of items that fail completely, Replacement of items that deteriorate with time. Sequencing models: Sequencing of n jobs on two machines and three machines with no passing. CPM- Determination of critical tasks. PERT- probability of completing the project on schedule.

Reference Books:

1. S.S. Raw," Optimization Methodologies".
2. H.A.TAHA," Operations Research". Pearson Education
3. S.D. Sharma," Operations Research & Optimization".
4. Kanti Swaroop, " Operations Research and Applications

Course No: MCA-209-EA

Course Title : MANAGEMENT INFORMATION SYSTEM (MIS)

Unit I

Organisation and Information Systems , Changing Environment and its impact on Business - The IT/IS and its influence - The Organisation: Structure, Managers and activities - Data, information and its attributes - The level of people and their information needs - Types of Decisions and information - Information System, categorisation of information on the basis of nature and characteristics. , Transaction Processing System (TPS) - Office Automation System (OAS) - Management Information System (MIS) - Decision Support System (DSS) and Group Decision Support System (GDSS) - Expert System (ES) - Executive Support System (EIS or ESS).

Unit II

Need for System Analysis - Stages in System Analysis - Structured SAD and tools like DFD, Context Diagram Decision Table and Structured Diagram. System Development Models: Water Flow, Prototype, Spiral, RAD – Roles and responsibilities of System Analyst, Database Administrator and Database Designer. Information systems for Accounting, Finance, Production and Manufacturing, Marketing and HRM functions - IS in hospital, hotel, bank

Unit III

Enterprise Resources Planning (ERP): Features, selection criteria, merits, issues and challenges in Implementation - Supply Chain Management (SCM): Features, Modules in SCM - Customer Relationship Management (CRM): Phases. Knowledge Management and e-governance ,Nature of IT decision - Strategic decision - Configuration design and evaluation Information technology implementation plan.

Unit IV

Security and Ethical Challenges , Ethical responsibilities of Business Professionals – Business, technology, Computer crime – Hacking, cyber theft, unauthorized use at work. Piracy – software and intellectual property. Privacy – Issues and the Internet Privacy. Challenges – working condition, individuals. Health and Social Issues, Ergonomics and cyber terrorism.

RECOMMENDED BOOKS:

1. “Management Information Systems”, Kenneth J Laudon, Jane P. Laudon, Pearson/PHI,10/e, 2007
2. “Management Information Systems”, W. S. Jawadekar, Tata McGraw Hill Edition, 3/e, 2004
3. Turban, Efraim, Efraim McLean, and James Wetherbe. 2007. Information Technology for Management: Transforming Organizations in the Digital Economy. New York, John Wiley & Sons.

Semester - III

Course No.: MCA-301-CR
Course Title: Design and Analysis of Algorithms

Unit I

Introduction to Algorithms, Analysis of algorithms, Designing Algorithms, Growth of Functions, Asymptotic notations, Recurrences , Substitution method , Iteration method, Recursion trees , The Master Method, Time and Space Complexity study of some basic algorithms.

Unit II

Randomized Algorithms: Identifying the repeated element, Primality testing, Advantages and Disadvantages.

Divide and Conquer, General method, Binary search, Quick sort.

Greedy Method, General method, Knapsack problem, Single source shortest paths.

Unit III

Dynamic programming, General methods, All pair shortest paths, Traveling salesman problems.

Backtracking, General method, 8-Queen problem, Sum of subsets, Knapsack problem.

Branch and Bound, General method, Least Cost Branch and Bound, 8-Queen Problem, Traveling salesperson problem.

Unit IV

Lower boundary theory, Lower bound theory through reductions, P and NP problems. NP hard and NP complete problems. Approximate Algorithms and their need, The vertex Cover Problem, The traveling salesman problem, The subset sum problem.

Text Book:

2. Pearson Horowitz, Sahni, “ Fundamentals of Computer Algorithms”, Galgotia Publications
3. Goodrich and Tamassia “ Algorithm design”

Reference Books:

1. Cormen, Leiserson, Rivest, Stein, “Introduction to Algorithms”, 2nd edition, PHI.
2. Aho, Hopcroft and Ullman, “The Design and Analysis of Computer Algorithms”, Pearson.

Course No: MCA-302-CR
Artificial Intelligence

Unit I

Introduction to AI, Search for solutions , Heuristic search, Genetic Algorithms, cross over, mutation, Fuzzy logic, fuzzification, fuzzy sets, hedges, max-product inferencing, max-min inferencing, multiple premise inference, multiple rule inference, defuzzification.

Unit II

First order logic, Inference in first order logic– Propositional versus first order logic, Expert Systems, Forward chaining , Backward chaining – Resolution , Knowledge representation , Uncertainty theory.

Unit III

Knowledge in learning, Inductive learning , Learning decision trees , Ensemble learning, Support vector machines, linearly separable hyper plane, non-linear cases, Statistical learning methods, Reinforcement learning.

Unit IV

Neural Computing, network architectures and learning paradigms , Single-layer perceptrons and their limitations , The Multilayer Perceptron : The sigmoid output function, Training by error back propagation, The Hopfield Model , Self-Organizing Nets : The Kohonen self-organising feature map.

TEXT BOOK

1. Russell, S. and Norvig, P., “Artificial Intelligence-A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, 2004.
2. Neural Computing: An Introduction; R Beale and T Jackson; Institute of Physics Publishing.

References :

1. Patterson ,” Introduction to Artificial intelligence and expert systems” , Pearson Education
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.

Luger, G.F., “Artificial Intelligence , Structures and Strategies for Complex Problem Solving”, Pearson Education / Prentice Hall of India, 2002.

Course No: MCA-305-EA
Course Title: Modeling & Simulation

Unit I

Concepts of Systems, Models, and Simulation. Distributed Lag Model, Cobweb Models, The process of a simulation Study, Exponential Growth Models, Exponential Decay Models, Type of simulation, Discrete-Event Simulation: Time-Advance Mechanisms, Components and Organization of a Discrete-Event Simulation Model. Monte Carlo Method. Simulation of Single-Server Queuing System, Simulation of an Inventory System

Unit II

Continuous Simulation: Pure-pursuit Problem.

Random Number Generators: Linear Congruential Generators, Other kinds of Generators, Testing Random-Number Generators.

Generating Random Variates: General Approaches, Continuous and Discrete distributions.

Unit III

Introduction to GPSS, General Description, GPSS block-diagram, Simulation of a Manufacturing Shop. SNA, Function, Simulation of a Supermarket, GPSS Model of a Simple Telephone System

Unit IV

Output Data Analysis for a Single System: Transient and Steady-State Behavior of a Stochastic Process, Type of Simulations with regard to output Analysis and Statistical Analysis for Testing Simulation. Verification and Validation of Simulation. An introduction of different types of simulation languages.

Reference Books:

- G. Gordon. "System Simulation", (3rd Edition) Pearson Education, 2000.
- Law and Kelton, "Simulation Modeling and Analysis", McGraw Hill, 2001.
- N. Deo, "System Simulation with Digital Computer", Prentice Hall of India 1979
- Fred Maryanski, "Digital Computer Simulation", CBSPD 1987
- James A. Pyne, "Introduction to Simulation- Programming Techniques and Methods of Analysis", McGraw Hill 1988
- Zeigler and Kim, "Theory of Modeling and Simulation", Academic Press, 2002
- Banks et al, "Discrete event Simulation", Pearson Education, 2001

Course No.: MCA-306-EA

Course Title: Object Oriented Modeling, Analysis & Design

Unit 1

OOAD – Introduction , Applying UML and Patterns in OOAD , Assigning Responsibilities , What is analysis and Design , An Example , The UML , Iterative Development –an Unified Process idea , Additional UP Best Practices and Concepts , The UP Phases and Schedule oriented Terms , The UP disciplines. Process Customization and the development case. The Agile UP. The Sequential Waterfall Lifecycle. Inception. Artifacts that may start in inception, Understanding requirements, types of requirements.

Unit 2

Use –case Model , Writing requirements in context , goals and stories , background , use cases and adding value , use cases and functional requirements , use case types and formats . Goal and scope of a use case , Finding primary actors , goals and use cases , writing use cases in an essential UI-free style , Actors , Use Case Diagrams , Use Cases within the UP , Case Study. Identifying other requirements. From inception to elaboration.

Unit 3

Use Case Model: Drawing System Sequence Diagrams. Example of an SSD. Inter System SSDs , SSDs and Use Cases , System Events and the System Boundary , Name System Events and Operations , Showing Use Case Text , SSDs within the UP. Domain Model : Visualizing Concepts , Domain Models , Conceptual Class Identification , Candidate Conceptual classes , Adding Associations , The UML association notation , NextGen POS Domain Model Associations , NextGen POS Domain Model , Adding Attributes , Non Primitive Data Type Classes , Adding Detail with Operation Contracts , Contract Sections , Post Conditions , Contracts , Operations and the UML. Operation Contracts within the UP.

Unit 4

From Requirements to Design , Interaction Diagram Notation , Sequence and Collaboration Diagrams , GRASP , Responsibilities and methods , interactions diagrams , Patterns , GRASP : Pattern of General Principles in Assigning Responsibilities , Information Expert , creator , Low Coupling , High Cohesion , Controller , Object Design and CRC Cards , Design Model : Use Case Realization with GRASP Patterns , Determining Visibility , Creating Design Class Diagrams , Mapping Design to Code. GRASP : More Patterns , Polymorphism , Pure Fabrication , Indirection , Protected Variations , GoF Design Patterns : Adapter , Factory , Singleton , Strategy , Façade , Observer / Publish-Subscribe / Delegation Event Model ,Relating Use Cases , Modeling Generalization , Refining the Domain Model , Adding New SSDs and Contracts , Modeling Behaviour in Statechart Diagrams , Designing Architecture with Patterns , Organizing the Design and Implementation Model Packages , Introduction to Architecture Analysis and the SAD.

Reference Books:

1. James Rumbaugh, “Object Oriented Models and Design” Pearson Education 2/e Harrington.”
2. C & Object Oriented Paradigm” John Viley & sons Publication
3. Ali Bahrani “Object Oriented Systems Development” McGraw -Hill 1999
4. Lafore Robert, “Object Oriented Programming in C++”, Galgotia Publications.
5. Balagurusami, E, “Object Oriented with C++”, Tata McGraw-Hill.

Course No: MCA-307-EA
Course Title: Data Mining.

Unit I

Data warehouse: Definitions, features, building blocks/ components, data marts, Meta data in data warehouse; planning a data warehouse, The project team, project management considerations, Business requirements; data design, the architectural plan, Data storage specifications, Information delivery strategy.

Unit II

Architecture and Infrastructure: Concept of data warehouse architecture, operational infrastructure, physical infrastructure, hardware and operating systems, database software, tools.
The role of metadata, metadata types, metadata requirements. Principles of dimensional modeling: Dimensional modeling basics, Use of CASE tools, The STAR schema, The Snowflake Schema.

Unit III

Data Extraction, Data Transformation, Data Loading.
Data Quality: Need, Data Quality Challenges, Data Quality Tools.
Information access and delivery, Information delivery tools.
Online Analytical Processing (OLAP): Features, functions, OLAP models, Implementation considerations, OLAP platforms, OLAP tools and products.

Unit IV

Introduction to Data Mining: definitions, Data mining techniques, applications.
Physical Design in data warehouse: Steps, Physical Design considerations, Physical storage.
RAID technology, estimating storage sizes, Indexing the data warehouse: B-Tree Index, Bitmapped Index, Clustered Index
Performance Enhancement Techniques: Data Partitioning, Data Clustering, Parallel processing, data arrays. Data warehouse deployment.

Text Book: Paulraj Pooniah , “ Data Warehousing Fundamentals “ Wiley

Reference:

Alex Berson , Stephen J. Smith “ Data Warehousing , Data Mining and OLAP , Tata McGraw Hill , 2004 Tenth reprint 2007.

Sam Anahory , Dennis Murray ,” Data Warehousing in the real world “ , Pearson Education

Course NO: MCA-308-EA
Course Title : Computer Networks

Unit I

Goals and applications of networks. LAN, MAN & WAN architectures. Concept of WAN subnet. Overview of existing networks. OSI Reference Model Architecture, TCP/IP Model and their comparison.

Unit II

Internetworking concept and architectural model. Connection-oriented and connection-less approaches. Concept of Autonomous systems and Internetwork Routing. Classful IP addresses. Subnetting, IP Multicasting. Internet Protocol (IP): connectionless delivery of datagrams (MTU, fragmentation, reassembly).

Unit III

Internet control protocols: ICMP, ARP and RARP. Routing algorithms: Interior (OSPF), Exterior (BGP). Transport Layer: UDP and TCP concepts. Socket API for Network Programming. Network Byte Ordering.

Unit IV

Client-Server application development using TCP & UDP sockets. Basic Server Architectures. Network Security: Firewalls and their components; Encryption techniques and examples of encryption standards.

Reference Books:

1. Andrew Tanenbaum, "Computer Networks", 4th Edition by Pearson.
2. Douglas Comer, "Internetworking with TCP/IP, Volume 1", Pearson.
3. W. Richard Stevens, "UNIX Network Programming", Pearson.
4. Maufer, "IP Fundamentals", Pearson.
5. Douglas Comer, "Client-Server Programming with TCP/IP, Volume 3", Pearson.

Course No: MCA-309-EA
Course Title: e-Commerce

Unit I :

Introduction: Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework, Impact of E-commerce on business, E-Commerce Models.

Network Infrastructure for E- Commerce:

Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY).

Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.

Unit II

Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

Unit III

Encryption: Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.

Unit IV

Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.

References:

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison- Wesley.
2. Pete Lohsin , John Vacca "Electronic Commerce", New Age International
3. Goel, Ritendra "E-commerce", New Age International
4. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education
5. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH
6. Turban, "Electronic Commerce 2004: A Managerial Perspective", Pearson Education

Semester - IV

Course No: MCA-401-CR
Course Title: Software Engineering

Unit I

Concept of Software engineering, Evolving role of software, Concept of software, Software Characteristics, Software Components, Software Engineering Challenges (Scale, Quality Productivity, Consistency and Repeatability, Change), Software standard, Software Engineering approach. Software Process Models: Waterfall Model, Prototyping Model, Spiral Model, Incremental Model, Concurrent Development Model.

Unit II

Software Process and Project Metrics : Measures , Metrics and Indicators , Software measurement : Size -Oriented Metrics , Function - Oriented Metrics , Extended Function point metrics. Capability Maturity Model Integration (CMMI), Process Planning, Estimation, COCOMO Model, Risk Analysis & Management: Software risks, Risk identification, Risk monitoring and management. **Software requirements**: need for SRS, requirement process; Requirement specification (characteristics, components), Concept of Use Cases, Concept of validation

Unit III

Design Engineering: Function oriented design, Design principles, Coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology; Object-Oriented Design, OO Concepts, Design Concepts, Design Methodology, Dynamic & Functional Modeling, Design Verification.

Unit IV

Software Quality Concepts: Quality, Quality control, Cost of quality; Software Quality Assurance (SQA), Formal approaches to SQA, Software Reliability: Measures of Reliability, Software safety, Quality Standards. Software Testing: Testing fundamentals, Black-Box Testing, White Box Testing, Regression Testing, Smoke Testing, Alpha Testing, Beta Testing, Recovery Testing, Security Testing, Stress testing, Performance testing.

Suggested Readings:

1. ROGER S. PRESSMAN - Software Engineering - A Practitioner's Approach, Sixth edition,
2. Pankaj Jalote - An Integrated approach to Software Engineering, 3rd edition, Narosa Publication.
3. Sommerville - Software Engineering. Pearson, 7/e , 2006.
4. Software Engineering SCHAUM'S Outlines, TMH.
5. JAMES F. PETERS Software Engineering – An Engineering Approach, Wiley& Sons

Course No: MCA-402-CR
Course Title: Computer Graphics

Unit I

Introduction to Computer Graphics. Applications of Computer Graphics. Graphic Display Devices_ Raster, Refresh, Random. Display Buffer, Concept of Double Buffering and Segmentation of Display Buffer. Use of Lookup tables. OpenGL API.

Unit II

2-D Graphics. Cartesian and Homogeneous Coordinate Systems. Line drawing algorithms (Bressenham's and DDA). Circle and Ellipse Drawing Algorithms. 2-Dimensional Transformations. Concepts of Window & Viewport, Window to Viewport Transformations. Filling, Boundary and Floodfill algorithms.

Unit III:

Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm), 3-D Graphics, Projections: perspective and parallel projection transformations. 3-Dimensional Transformations. Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection.

Unit IV

Curves and Surfaces, Splines, Spline specification, Interpolated & Approximated Splines. Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. B-Splines curves and surfaces. Fractals - Fractal Generation Procedure.

Text Book : Hearn and Baker “Computer Graphics” 2nd Edition , Pearson Education.

Reference Books

1. W.M.Newman and Sproull. “Principles of interactive Computer Graphics” ,TMH
2. Steven Harrington.” Computer Graphics a Programming Approach” McGraw Hill.
3. Plastock and Kelley. “Schaums outline of theory and problems of computer Graphics”
4. David F Rogers and J Alan Adams. “Procedural Elements of Computer Graphics” McGraw Hill
5. David F Rogers and J Alan Adams. “Mathematical Elements of Computer Graphics” McGraw Hill
6. James. D. Foley, A Vandam etal “Computer Graphics” Pearson.

Course No: MCA-405-EA

Course Title: UNIX/LINUX Programming

Unit I

Unix Basics: Introduction to Unix/Linux, Basic Commands, Text processing commands, data processing in Unix/Linux, Unix Administration – creating and managing users, managing printing.

Unit II

Introduction to Shell: Unix/Linux Shells, Shell variables, Environment variables. Arithmetic, Relational and Logical operators.

Programming with Shell: Shell Programming, Different Shell constructs, looping statements, decision statements, keywords, solving arithmetic expressions.

Unit III

GUI Development in Unix/Linux: Accessing Unix and Linux in GUI mode, Introduction to X Windows. Introduction to GUI development in Unix and Linux, Introduction to Qt as development tool. Introduction to various controls and forms in Qt. Designing simple forms in Qt, manipulating various controls in Qt.

Unit IV

Database Basics with Unix and Linux: Basics of Database, Introduction to MySQL, Basic commands of MySQL e.g. insert, delete, update etc. Connecting to database with Qt. Develop small application using Qt and MySQL.

References Books:

Kernighan and Pike, “The UNIX Programming Environment”, Pearson Education.

Karnetkar, “ UNIX Shell Programming”, BPB.

Tackett & Burnett, “Using Linux- Special Edition(Que)”, PHI.

Course No: MCA-406-EA
Course Title: Theory of Computation & Formal Languages

Unit I

Basic concepts of theory of computation: Formal Languages and Grammars, Finite State Transducers, Finite-State Automata and Regular Languages, Limitations of Finite-Memory Programs.

Unit II

Recursive finite-domain programs, Recursion, Pushdown Transducers, Context-Free Languages, Limitations of Recursive Finite-Domain Programs

Unit III

Turing Machines. Programs and Turing Transducers, Universal Turing Transducers, Undecidability.

Unit IV

Introduction to resource-bounded computation, Time and Space, A Time Hierarchy, Nondeterministic Polynomial Time, some NP-Complete Problems

Text Book:

1. Hopcroft, J., and Ullman, J. (1979), “*Introduction to Automata Theory, Languages and Computation*”, Pearson Education.
1. P. Linz, “*Introduction to Formal Languages and Automata*”, 3rd edition, 2000, Jones and Barlett, PWS Publishing Company.

Suggested Readings:

1. Eiton Gurarri : *Introduction to Theory of computation*, Computer Science press
2. Hopcroft J, R. Motwani, and J. Ullman, “*Introduction to Automata Theory, Languages and Computation*, 3rd Ed. 2006, Pearson Education.

Course No: MCA-407-EA

Course Title: Pervasive Computing

Unit I

Technologies : Past, Present, Future , Pervasive Computing , The pervasive computing market, m-Business , Conclusions and Challenges , Future , Application Examples , Device Technology : Hardware , Human-machine interfaces , Biometrics , Operating Systems , Java for Pervasive devices , Device Connectivity : Protocols , Security , Device Management , Web Application Concepts : History of World wide Web . World wide Web Architecture , Protocols , Transcoding , Client Authentication via the Internet.

Unit II

, WAP : Introduction , Components of the WAP architecture , WAP infrastructure , WAP Security Issues , Wireless Markup Language , WAP push , Products , i-mode , Voice Technology : Basics of Speech Recognition , voice standards , speech applications , speech and pervasive computing , security, Personal Digital assistants : History , Device Categories , PDA Operating Systems , Device Characteristics , Software Components , Standards , Mobile Applications , PDA browsers.

Unit III

Architecture : Server Side Programming in Java : J2EE and overview , Servlets, Enterprise Java Beans , Java Server Pages , Extensible Markup Language , Web services , Model-View-Controller Pattern, Pervasive web application architecture : Background , scalability and availability , Development of pervasive computing web applications , Pervasive application architecture.

Unit IV

Example Application: Introduction, User Interface overview, Architecture, Implementation. Access from PCs: Smart Card-based authentication via the Internet, Ordering goods , Access via WAP : WAP functionality , Implementation , Access from Personal Digital Assistants: Extending the example application to personal digital assistants. Implementation for synchronized devices, for intermittently connected devices, for connected devices. Access via voice: Extending the example application to voice access, Implementation.

Reference Books :

Jochen Burkhardt, Dr. Horst Henn , Stefan Hepper , Klaus Rintdorff, Thomas schack “ Pervasive Computing “ Technology and Architecture of Mobile Internet Applications , Pearson Education.

Course No: MCA-408-EA
Course Title : Advanced Software Engineering

UNIT I-TESTING BASICS and TEST CASE DESIGN

Software Testing Techniques Classification. Test case design strategies. Evaluating test adequacy criteria. White Box Testing: Static white box testing, dynamic white box testing. Structural Testing - Control Flow Testing and its techniques. Data Flow Testing and its techniques. Mutation testing and its techniques. Automated code coverage analysis. Test Adequacy Criteria, Additional white box test design approaches. Black Box Testing: Static black box testing, dynamic black box testing, Functional testing and its techniques, Random testing and its techniques. Additional black box test design approaches, Black box testing and COTS.

UNIT II- SOFTWARE TESTING EXECUTION AND TESTING TOOLS

Unit test – Unit test planning – Designing the unit tests – The class as a testable unit – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – System test – The different types – Regression testing – Alpha, beta and acceptance tests.

UNIT III-SOFTWARE RELIABILITY

Introduction to Software Reliability: Basic Concepts, Software Reliability , Hardware Reliability, System Reliability, Software Reliability metrics, Operational Profile, Reliability Modeling, General Model Characteristics, Execution Time Component , Calendar Time Component , Calendar Time to Execution Time Relationship, Markovian Models: Poisson Type Models, Binomial Type Models, Poisson Type Models versus Binomial Type Models, Numerical examples.

UNIT-IV SOFTWARE RELIABILITY Models

Specific Models: Finite and Infinite Poisson Type Models, Musa Basic Model versus Logarithmic Poisson Model. Numerical examples. Parameter Estimation: Maximum Likelihood Estimation versus Least Squares Estimation. Comparison of SRGMs: Comparison criteria, Calendar Time Modeling and its Estimation.

Text Book:

1. ROGER S. PRESSMAN - Software Engineering - A Practitioner's Approach, Sixth edition,
2. J.D. Musa, A. Iannino, K. Okumoto "Software Reliability: Measurement, Prediction and Application"
Tata McGraw Hill

References:

1. PankajJalote - An Integrated approach to Software Engineering, 3rd edition, Narosa Publication.
2. Sommerville - Software Engineering. Pearson , 7/e , 2006.
3. SCHAUM'S Outlines, TMH.
4. JAMES F. PETERS Software Engineering – An Engineering Approach, Wiley& Sons

Course No : MCA-409-EA
Course Title: Image Processing

UNIT I

Introduction to discrete time signals and systems: Discrete time signals, Discrete time systems, Analysis of discrete time, Linear time-invariant systems [Both 1D and 2D].

Introduction to digital image processing: Digital Image representation, Fundamental steps in image processing. Elements of digital image processing systems, Applications of digital image processing

UNIT II

Image sensing and acquisition. Image sampling and quantization, imaging geometry.

Image transforms: Concepts of Spatial domain and Frequency domain Images, Fourier, Inverse Fourier, Fast Fourier [Both 1D and 2D].

UNIT III

Image Enhancement: Enhance in the spatial domain, some basic grey level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing of spatial filters, Sharpening spatial filters.

Enhancement in frequency domain: Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering.

UNIT IV

Image Restoration: Model of the image Degradation / Restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Linear, Position- invariant degradation, Estimating the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering, Constrained least squares filtering, Restoration by SVD.

Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding based segmentation, Region based segmentation.

Image Compression models: Error criteria, Lossy compression, Loss-less compression.

Reference Books :

- 1) Digital image processing 2nd edition by Rafael C.Gonzalez,Richard E.Woods(Pearson edition) .
- 2)Fundamentals of digital image processing by A.K.Jain(Pearson edition) .
- 3)Fundamentals of digital image processing by Catlemrene(Pearson edition).
- 4)Image processing analysis and machine vision by Milan Sonka,Vaclahlavac,Roger Boyle.
- 5)Digital signal processing by John G.Proakis, G.Manolakin “, 4/e Pearson Education

Course No : MCA-410-EA
Course Title: Machine Learning

Unit I

Euclidean Distance Classifier, Mahalanobis Classifier, Basic Sequential Algorithm Scheme, K-Means Algorithm, Fuzzy C-Means Clustering, Clustering with Gaussian probability Density Function.

Unit II

Review and extension of support vector machines, Principal Component Analysis, Projection of data to an optimal plane, Fisher Linear discriminant analysis, multiple discriminant analysis, Dimensionality reduction.

Unit III

Biometrics, algorithms for face recognition, algorithms for finger print recognition, algorithms for iris recognition, algorithms for speech recognition.

Unit IV

Review and extension of inductive learning algorithms, Hypothesis testing and evaluation, review and extension of evolutionary algorithms, emerging topics in machine learning, project work in machine learning.

Text Books :

1. *Machine Learning* by Tom M. Mitchel, McGraw-Hill publication
2. *Pattern Classification* by Duda and Hart. John Wiley publication

Semester - V

Course No: MCA-501-CR

Course Title : Java Programming

Unit I

Java Program Development , Java Source File Structure , Comparison with other languages (C & C++), Java and Internet, Features of Java, Java Virtual machine, ByteCode , Lexical Tokens, Identifiers, Keywords, Literals, Comments , Primitive Datatypes, Variables: Assignment, Initialization and Conversions, Operators: Arithmetic, Assignment, Modulus, Relational, Boolean, Bitwise., Precedence Summary ,Unicode Character Set , Arrays: Single and Multidimensional. Control Statements and Looping Structures

Unit II

Class Fundamentals , Object reference , Garbage Collection, Constructors, Access Control, Modifiers, methods , Nested , Inner Class & Anonymous Classes , Abstract Class, Argument Passing Mechanism , Method Overloading, Recursion , Dealing with Static Members. Finalize() Method, Native Method. Use of “this “ reference , Cloning Objects, Generic Class Types, Inheritance in Java , Overriding Super Class Methods, Use of “super”, Polymorphism in inheritance , Type Compatibility and Conversion ,Packages & Interfaces: Defining and importing packages , Understanding Class path , Implementing interfaces.

Unit III

Exceptions & Errors ,Types of Exception ,Control Flow In Exceptions , Use of try, catch, finally, throw, throws in Exception Handling ,In-built and User Defined Exceptions, Checked and UnChecked Exceptions, Operation on String ,Mutable & Immutable String , Using Collection Bases Loop for String , Tokenizing a String ,Creating Strings using StringBuffer , Multi-Threaded Programming ,Thread Life-Cycle , Thread Priorities , Synchronizing Threads , Inter -communication of Threads, DeadLock. Applet & Application , Applet Architecture, Parameters to Applet , Embedding Applets in Web page. Utility Methods for Arrays , Observable and Observer Objects , Date & Times , Using Scanner.

Unit IV

Streams, Input and Output Classes,The Standard Streams,File Object , File I/O Basics , Reading and Writing to Files ,Buffer and Buffer Management, Read/Write Operations with File Channel , Serializing Objects , The Collection Framework , Collection Types , Sets , Sequence , Map , Hashing ,Use of ArrayList & Vector , Event-Driven Programming ,The Event Delegation Model , Event Classes, Event Sources , Event Listeners , Adapter Classes, Anonymous Inner classes , Keyboard and Mouse Event Handling , Avoiding Deadlocks in GUI Code ,Networking Basics , Client-Server Architecture , Socket Overview, Networking Classes and Interfaces , Network Protocols ,Developing Networking Applications in Java

Suggested Readings:

1. Herbert Schildt, “The Complete Reference Java-2 “ ,Sixth Edition 2004,Tata McgrawHill.
2. Dietel & Dietel, “Java: How to Program Java 2, Sixth Edition, 2006, Pearson Education.
3. Horstmann & Cornell, “Java2 Vol-1 & Vol-2”,Seven Indian Reprint 2006, Pearson Education.
4. E. BalaGurudamy “ Programming with java A Primer” 3rd edition

Course No.: MCA-502-CR
Course Title: System Programming

Unit I

Introduction, Machine Structure , Evolution of the Components of programming system Evolution of Operating Systems, General Machine Structure , General Approach to a New Machine , Machine Structure 360-370, Machine Language. Assembly Language

Unit II

General Design Procedure, Assemblers, Design of an single pass assembler and multi pass assembler, Macros: two pass algorithm, single pass algorithm, Implementation of macro calls within macros

Unit III

Loaders and Linkers, Loader Schemes, subroutine linkages, relocating loaders, Linking loaders, Design of an absolute loader, Design of a direct linking loader.

Unit IV

Formal Systems and Programming Languages: Formal specification, Hierarchy of Languages, BNF, Canonic Systems and Formal Systems.

Compilers, Statement of problem, phases of Compiler-Lexical phase, syntax phase Interpretation phase, optimization, storage assignment code generation and assembly phase, Passes of a compiler.

Text Book: John J. Donovan, “Systems Programming”, Tata McGrawHill

Reference Books:

Leland L.Beck."System Software" 4th edition Pearson 1997

Barron.D.W."Assemblers and Loaders" Mc Donald and Javes 1978

Ullman.J.D."Fundamentals of Programming System" Addison and Wesley

D.M.Dhamdhere."System Programming and Operating Systems"2nd edition

Course No.: MCA-505-EA

Course Title: Minor Project (Research in SE/AI/CN/DBMS)/ (Software Development)

Course Title: Software Project Management
Course No: MCA-506-EA

UNIT I

INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning. Strategic Assessment – Technical Assessment – Cost Benefit Analysis

UNIT II

PROJECT EVALUATION

–Cash Flow, Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation. Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

UNIT III

MONITORING AND CONTROL

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT IV

MANAGING PEOPLE AND ORGANIZING TEAMS Introduction – Understanding Behavior – Organizational Behavior: A Background –Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation– The Old man – Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.

TEXT BOOK:

1. Bob Hughes, Mikecoterrell, “Software Project Management”, Third Edition, Tata McGraw Hill, 2004.

REFERENCES:

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Walker Royce, “Software Project Management - A Unified Framework”, Pearson Education,2004.
3. Jalote, “Software Project Management in Practive”, Pearson Education, 2002.
2. Humphrey Watts, “Managing the Software Process”, Addison Wesley, 1989.

Course No.: MCA-507-EA
Course Title : Compiler Construction

UNIT 1:INTRODUCTION

Introduction to compilers, translators, structure of a compiler. Programming languages: high level programming languages, lexical and syntactic structure of a language, parameter transmission, storage management.

UNIT 2: AUTOMATA

Finite automata and lexical analysis: role of lexical analyzer, design of lexical analyzers, regular expression, finite automata, minimizing number of states of DFA.

Syntactic specification of programming languages: context free grammars, derivation and parse tree, capabilities of CFG's.

UNIT 3:

Basic parsing techniques: parsers, shift reduce parsers, operator precedence parsing, top down parsing, predictive parsers, LR parsers, SLR parsers.

UNIT 4: IMPLEMENTATION

Syntax directed translation: schemes, implementation, intermediate code, postfix notation, parse and syntax tree, three address code, quadruples and triples.

Symbol tables, error detection and recovery, code optimization, loop optimization, code generation.

BOOKS RECOMMENDED:

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools , Addison-Wesley, 1988.
2. Dhamdhare. Compiler Construction, McMillan India. Holmes. Object Oriented Compiler Construction, Prentice Hall.

References:

1. Fraser and Hanson. A Retargetable C Compiler: Design and Implementation , Addison-Wesley
2. Holmes. Building your own Compiler with C++, Prentice Hall. Wirth. Compiler Construction, Addison-Wesley.

Course No: MCA-508-EA
Course Title: C# Programming

Unit I

Introduction to windows Programming. .Net Architecture and Platform, The relationship of C# to .net, The Common Language Runtime, A Closer Look at Intermediate Language , Distinct Values and Reference types, Use of Attributes, Assemblies , Private Assemblies , Shared Assemblies, Creating .net applications using C#, Creating windows forms ,Windows controls, The role of C# in the .net enterprise architecture. C# IDE.

Unit II

Variables and Data Types, Program Flow Control in C#, Arrays, Using statement, Namespace , Aliases , The Main() Method, Passing Arguments to main() . Console I/O, Using Comments, Operators and Casts, Error and Exception Handling.

C# IDE, Basic Window Controls: Text Box, Label, Check Box, List Box, Checked List Box, Radio Buttons, Buttons, Tree View and List View Controls,

Unit III

Objects and Type: Classes and Structs, Partial classes , static classes ,Function Overloading, Operator Overloading, Inheritance : Types of inheritance, virtual methods, hiding methods , Sealed classes and methods, Interfaces, Derived interfaces.

Type safety, Type conversions, Boxing and unboxing , comparing objects for equality , Operator overloading , User defined casts. Delegates and Events, Strings and regular expressions, Collections, Array Lists, The Stack, Queue, and Sorted List class, Hash Tables.

Unit IV

Multi Threading in C#, ADO.NET overview, Using Database Connections ,Executing commands , The Data Reader, The Dataset Class Populating a Dataset , Persisting Dataset Changes , viewing .net data using Data Grid.

Text Book : Professional C# 2008 by Christian Nagel , Bill Evgen , Jay Glynn Wrox Publications , 2008.

Reference

1. Dietel & Dietel , "C# , How to Program",Pearson Education.
2. Visual C#.Net by John Sharp & John Jagger, PHI, New Delhi.
3. Visual Studio .Net by Francisco, Microsoft Publication.
- 4.

Course No: MCA-509-EA
Course Title: Wireless Communications

Unit I

Classification and types of Wireless telephones. Introduction to Cordless, Fixed Wireless(WLL), Wireless with limited mobility(WLL-M) and (Fully)Mobile Wireless phones. Introduction to various generations of mobile phone technologies and future trends. Wireline vs. Wireless portion of mobile communication networks. Mobile-Originated vs. Mobile-Terminated calls. Mobile-Phone numbers vs. Fixed-Phone numbers; Billing Issues.

Unit II

Electromagnetic spectrum, its use and allocation to well-known bands. Concept of cells, sectorization, coverage area, frequency reuse, cellular networks & handoffs.

Unit III

Wireless Transmission concepts; types of antennas, signal propagation, multipath propagation. Comparison of FDM, TDM and CDM techniques. Basic concepts of Spread Spectrum(SS) technique; Direct Sequence SS versus Frequency Hopping SS.

Unit IV

Simplified implementation of IS-95 CDMA using chip sequences. Concept of CDMA(PCS& Cellular) channel; Forward and Reverse CDMA channel for a cell/sector. Concept of(Walsh)Code Channels within a CDMA Channel. Purpose of Pilot, Sync, Paging, Forward Traffic Channels. Purpose of Access & Reverse TCs. Comparison of Cellular and PCS CDMA networks; frequencies and cell-sizes. Advantages/Disadvantages of smaller cell size. Concept of Voice Coding . Components of Mobile Network Infrastructure: MS, BTS, BSC, MSC; their basic functions and characteristics. Types of handoffs in GSM. Use of HLR and VLR in mobile networks.

References Books:

1. Andy Dornan, “The Essential Guide to Wireless Communications Applications”, Pearson.
2. Jochen Schiller, “Mobile Communications”, Pearson.
3. K.Pahlavan, P.Krishnamurthy, “Principles of Wireless Networks”, Pearson Education.
4. Andrew Tanenbaum, “Computer Networks(4th Edition)”, Pearson Education.
5. T. Rappaport, “Wireless Communications, Principles and Practice” (2nd Edition).
Pearson Education

Course No: MCA-510-EA
Course Title: Bioinformatics

Unit I

Introduction to bioinformatics, Definitions and concepts, Biological complexity, The role of bioinformatics. Types of biological data, types of Biological Databases – flat file databases, relational databases, object-oriented databases, XML representation of biological databases, Sequence databases (EMBL, GenBank, DDBJ, SWISS-PROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, SMART, etc), Protein structure and fold classification databases (PDB, CATH, SCOP), pathway databases, PubMed database.

Unit II

Search engines - SRS, Entrez; BLAST, FASTA, Data Submission Tools: Nucleotide Sequence Submission Tools, Protein submission tools, Command line Tool for GenBank; Data Analysis Tools: Tools for Nucleotide Sequence Analysis, Tools for Protein sequence Analysis; Prediction tools: Phylogenetic trees and phylogenetic Analysis, Gene Prediction, Protein structure and Function prediction; Modeling tools: Tools for 2D Protein Modeling, Tools for 3D protein Modeling

Unit III

Ontologies in Bioinformatics: The need for ontologies (Gene naming, functional classifications, references schemes), Classification of ontologies – one dimensional, 2 dimensional, three dimensional, Gene ontology, EcoCyc etc.

Introduction to Markup Languages for biological data: BioML, ProML, CML, GAME, AGAVE

Unit IV

Querying and Integration of Biological Databases: Warehouse Integration, mediator-wrapper based integration, navigational integration. Existing systems and their drawbacks. XPath query language for querying biological data.

Reference Books:

1. Developing Bioinformatics Computer Skills, Cynthia Gibas & Per Jambeck, O'Reily
2. Bioinformatics – Databases, Tools and Algorithms, Orpita Basu, Simminder Kaur Thukral, Oxford Higher Education.
3. Introduction to bioinformatics, T. K. Attwood & D J Parry-Smith, Pearson Education
4. Bioinformatics – A beginner's Guide, Jean-Michel Claveriw, Cerdric Notredame, WILEY DreamTech India Pvt.
5. Krane , "Bioinformatic", Pearson Education.

Semester – VI

Course No: MCA-601-CR
Course Title: SRS, Analysis and Design

UNIT -I

Software Requirements Analysis and Specification Concepts:

Requirement Engineering, Requirement Elicitation Techniques, Requirements Documentation, Characteristics and Organization of SRS, Analysis Principles, Analysis Modeling – Data Modeling, Functional Modeling and Behavioral Modeling; Structured vs. Object Oriented Analysis.

UNIT -II

Software Design and Coding Concepts:

Design Principles, Data Design, Architectural design, Interface Design, Component Level Design, Object Oriented Design Concepts, Cohesion and Coupling and their classification, top-down, bottom-up and middle-out design, Coding, Coding Standards, Coding Conventions, Programming Style.

UNIT –III

Testing:

Verification and Validation, Testing Process, Design of Test Cases, Functional Testing, Software Testing Strategies, Unit Testing, Integration Testing, Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, System Testing and Debugging.

Software Quality Assurance:

Software Quality, Software Quality Factors, Quality Assurance and Standards, Quality Planning, Quality Control, ISO 9000 Certification for Software Industry, SEI Capability Maturity Model and Comparison between ISO & SEI CMM. Introduction to Six Sigma, SPICE.

UNIT –IV

Technical Metrics for Software:

Software Measurements: What and Why, A Framework for Technical Software Metrics, Metrics for the Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Software Quality, Metrics for Maintenance.

CASE (Computer Aided Software Engineering) and Introduction to UML:

CASE and its Scope, Building blocks of CASE, CASE Tools, CASE Environment, UML Concepts, Use Case Diagrams, Sequence Diagrams, Collaboration Diagrams, Class Diagrams, State Transition Diagrams, Component and Deployment Diagrams.

Text Book:

1. Ian Sommerville : Software Engineering, Seventh Edition, Pearson Education.

References:

1. R.S. Pressman : Software Engineering: A Practitioner's Approach, Sixth Edition, McGraw Hill.
2. S.L. Pfleeger, J.M. Atlee : Software Engineering: Theory and Practice, Second Edition, Pearson Education.
3. Douglas Bell : Software Engineering for Students, Fourth Edition, Pearson Education.
4. Pankaj Jalote : An Integrated Approach to Software Engineering, Second Edition, Narosa.
5. K.K. Aggarwal, Yogesh Singh : Software Engineering, Second Edition, New Age International.

Course No: MCA-602-CR
Course Title: Software Testing

UNIT -I

Introduction:

Software Process, Characteristics of a Software Process, Process Models, Project Management Process and its Phases, Software Measurements, Metrics, Scheduling, Estimation.

Software Quality Assurance Concepts and Standards :

Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Reliability, Software Safety, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, TQM, Six Sigma, SPICE,

UNIT -II

Risk Management and Change Management:

Software Risks, Risk Identification, Risk Projection, Risk Refinement, The RMMM Plan, Software Configuration Management, Baselines, Software Configuration Items, SCM Process: Version Control, Change Control, Configuration Audit, Configuration Management for Web Engineering.

UNIT -III

Software Testing:

Testing, Verification and Validation, Test Strategies for Conventional and Object Oriented Software, Unit Testing, Integration Testing, Validation Testing, Alpha and Beta Testing, System Testing, Recovery Testing, Security Testing, Stress Testing, Performance Testing, Metrics for Source Code, Metrics for Testing, Debugging Process, Debugging Strategies.

Testing Techniques:

Software Testing Fundamentals, Black Box and White Box Testing, Basis Path Testing, Flow Graph Notation, Independent Program Paths, Graph Matrices, Control Structure Testing, Condition Testing, Data Flow Testing, Loop Testing, Graph Based Testing Methods, Equivalence Partitioning, Boundary Value Analysis, Object Oriented Testing Methods: Applicability of Conventional Test Case Design Methods, Fault-Based Testing, Scenario-Based Testing, Random Testing and Partition Testing for Classes, InterClass Test Case Design.

UNIT -IV

Testing Process:

Test Plan Development, Requirement Phase, Design Phase and Program Phase Testing, Testing Client/Server Systems, Testing Web based Systems, Testing Off-the-Shelf Software, Testing in Multiplatform Environment, Testing for Real Time Systems, Testing Security.

SOFTWARE TESTING TOOLS: Taxonomy of testing tools, Methodology to evaluate automated testing tools, Load runner, win runner and rational testing tools, silk test, java testing tools. JMetra, JUNIT, cactus

Text Book:

1. Ian Sommerville : Software Engineering, Seventh Edition, Pearson Education.
2. R.S. Pressman : Software Engineering: A Practitioner's Approach, Sixth Edition, Tata McGraw-Hill.
3. William E. Perry : Effective Methods for Software Testing, Second Edition, John Wiley & Sons.

References:

1. S.L. Pfleeger, J.M. Atlee : Software Engineering: Theory and Practice, Second Edition, Pearson Education.
2. K.K. Aggarwal, Yogesh Singh : Software Engineering, Second Edition, New Age International.
3. Pankaj Jalote : An Integrated Approach to Software Engineering, Second Edition, Narosa.
4. Nina S Godbole : Software Quality Assurance – Principles and Practice, Narosa.
5. Boris Beizer : Software Testing Techniques, Second Edition, Dreamtech.

Course No: MCA-603-CR
Course Title: Software Project Demonstration

Course No: MCA-604-CR
Course Title: Software Project Dissertation

Course No: MCA-605-EA
Course Title: Oracle Database Management 1 and 2

UNIT -I

Overview of database, Pfile, SPfile, Instance, Tablespaces, Datafiles, Other files Oracle managed files, Users, Schemas, Indexes, View, Sequences, Synonyms Privileges, Roles. Clusters, Hash clusters ,Internal memory structure, SGA, PGA Background processes, External structure, Redo logs, Control files, Trace files, Alert logs Creating database manually, Client/server databases application, Standby databases, Database file layouts, I/O connections among data files, I/O bottlenecks among all data files Concurrent I/O among background processes ,Defining recoverability and performance goals for the system, Defining the system hardware and mirroring architecture, Database space using overview, Implementation of the storage clause, Locally managed Tablespaces, Dictionary managed Tablespaces, Table segments, Index segments, Rollback segments, Temporary Free space, Resizing Datafiles, Control files, Online redo log Files, Deallocate space from segments, Shrinking Datafiles, Shrinking Tables, Clusters and indexes, Oracle managed files(OFA)

UNIT -II

Describe logical structure of a database, Different types of tablespaces, Changing the Tablespaces size, Allocating segments for temporary segments, Temporary segments in permanents Tablespaces, Changing tablespace status, Changing tablespace storage settings
Oracle Managed Files (OMFs),Oracle Flexible Architecture(OFA) , Different segments types and relationships, Extent usages, Block space utilization, Types of Logical and Physical backups, Implementations , Integrations of backup procedures, NOARCHIVELOG Mode, ARCHIVELOG Mode Backup Methods –Closed Database Backup, Open Database Backup, Recovery in NOARCHIVELOG Mode, Recovery in ARCHIVELOG Mode, Recovery manager architecture, Recovery Manager Features , Using Recovery manager & RMAN, Using OEM backup manager, Generating lists and reports

UNIT -III

Overview of SQL *Net and Net8, Connect descriptors, Service names and Listeners, Net8 assistants, The multi protocol interchange, Dedicated Server Processes, Oracle Shared Server, Benefits of Oracle Shared Server, Client Server application, Database links, Tuning application design, Tuning SQL, Memory usage, Data storage, Data manipulation, Physical storage, Logical storage, Reducing net traffic using OEM

UNIT -IV

Security capabilities-Account security, Object privileges, System level roles and privileges
Implementing security-operating system security, Create user, Drop user, User profiles, Password managements, Preventing password reuse, Setting password complexity, Using password file for authentication ,Auditing , Login audits, Action audits, Object audits, Protecting the audit trail

Reference:

1. Oracle 9i DBA Handbook

By- Kevin Lonely, Marlene Theriault.

Oracle Press (Tata McGraw Hill Publication)

2. Oracle OCA Oracle 9i Associate DBA Certification Exam Guide

By- Jason Couchman, Sudheer N. Marishetti

Oracle Press (Tata McGraw Hill Publication)

Course No: MCA-606-EA
Course Title: Dot NET Technologies

UNIT I

HTML - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Colour controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes List types and its tags, Use of Frames and Forms in web pages Introduction to .NET Framework, .NET Architecture, CIL and JIT, Assemblies, Managed Code, Garbage Collection, MSIL and Metadata, CLR, CLI, CLS.

UNIT II

VB.NET Concepts: Flow Control, Type Conversions, Complex Variable Types, Arrays, Structs, String Manipulation. Functions, Debugging and Error Handling.
Object Oriented Programming using C#, Collections, Comparisons and Conversions. Generics.

UNIT III:

Basic Windows Programming: Controls, Button, Label and Link Label, Text Box, Radio and Checkbox, RichTextBox, List and CheckBoxes, TreeView and ListView Controls, Tab Control. Menus and ToolBars, SDI and MDI Applications.

UNIT IV

ASP.NET Web Programming: Site Management (Client and Server Side), Styles, Master Pages, Site Navigation, Authentication and Authorization, Web Service.

Data Access: Streams, XML, Connection and Command Objects, Data Reader, Data Adapter, Data Set.

Text Book : Professional VB.NET 2010 by Christian Nagel , Bill Evgen , Jay Glynn Wrox Publications , 2006.

Reference

1. Dietel&Dietel , “VB.NET , How to Program”,Pearson Education.
2. Visual Basic.Net by John Sharp & John Jagger, PHI, New Delhi.
3. Visual Studio .Net by Francisco, Microsoft Publication.

Course No: MCA-607-EA

Course Title: Advanced Java Programming

Unit I

Java EE Overview, • Distributed Multi tiered Applications, Business Components, Containers – services & types, Application Assembly & Deployment – Packaging Applications, Java EE modules, Getting Started with Web Applications, • Model View Controller (MVC)2 Architecture & Packaging EJB Module, Web application development and deployment Steps, Configuring Web application – Web application deployment descriptor (web.xml file), Web Application Archive (*.WAR file) – *.WAR directory structure, • Building & Deploying Applications, Ant build tool

Unit II

Servlet Overview, • Life cycle of Servlet, Handling Client HTTP Request & Server HTTP Response, Initializing Parameters & ServletContext, Initializing a Servlet, ServletContext initialization Parameters, ServletContext Attributes (Context binder, Session Management, Request Dispatcher & Redirecting, Overview of JSP, JSP Architecture & life cycle, Components of Java Server Pages, Implicit Objects & Standard JSP Tags, Scope of JSP objects, • JDBC Overview & Architecture, • Step By Step Usage of JDBC API, • Connecting to MySQL Database in Java, Prepared Statement & JDBC Transactions Developing Web Application with MySQL Database by implementing Java Beans, DAO's & MVC2 Architecture

Unit III

EJB 3.0 overview & Architecture, Features of EJB 3.0, About Session Beans, EJB 3.0 Persistence Programming Model, • Java EE Application Assembly and Deployment – Anatomy of EJB Module & Packaging, • Java Persistence API, • Designing a Java Enterprise Application, Developing EJB Module using Stateless, Stateful Session Beans & Entity Beans. And creating an Enterprise Application Project using Eclipse Indigo 3.7.1 + JBOSS v5.0 + MySQL 5.0

Unit IV

Struts2 Basics & Architecture, Struts Request Handling Life Cycle, Struts2 Configuration, Struts2 Actions, Struts2 Interceptors, Struts2 Results,, Struts2 Value Stack/OGNL, Struts2 Tag Libraries, Struts2 XML Based Validations , Practical (Building Struts2 XML based Validation Application), Struts2 Database Access, Introduction to Hibernate, ORM Overview, Hibernate Environment, Hibernate Architecture & API, Hibernate Configuration, Hibernate Sessions, Persistent Class & Mapping Files, Building Hibernate application, Hibernate Query Language (HQL), Hibernate O/R Mappings – Collection & Association Mappings, Hibernate Annotations, Introduction to Spring Framework Architecture

Reference Books:

1. Core Servlets and Java Server Pages

By- Marty Hall & Larry Brown vol-1 Low price edition

2. The Complete reference Struts

By James Holmes

Additional Reference Books:

- 1) The Java Handbook by Patrick Naughton, Michael Morrison Publisher: Osborne/McGraw-Hill
 - 2) Web Developer's Guide to JavaBeans by Jalal Feghhi Publisher: Coriolis Group
 - 3) Special Edition Using Enterprise Java , by Jeff Schneider, Rajeev Arora Publisher: Que
 - 4) Teach Yourself Java Database Programming with JDBC in 21 Days , by Ashton Hobbs , Publisher: SAMS.net
 - 5) Java Web Magic , by Joseph Sinclair, Lee Callister , Publisher: Hayden
 - 6) Mastering Java by Laurence Vanhelsuwe, Andre Yee, Ivan Phillips, Goang-Tay Hsu ,Publisher: Sybex
 - 7) Java Developer's Guide , by Jamie Jaworski , Cary Jardin , Publisher: SAMS.net
 - 8) **Expert One-on-One J2EE Design and Development**, Rod Johnson , Wrox Publications
 - 9) **Professional Java Server Programming J2EE, 1.3 Edition** by Ramesh Nagappan, Wrox Publications
- i.

Course No: MCA-608-EA

Course Title : Organization Behaviour and Personal Management

Unit – I

Basic Concepts of Management, Definition, Need and Scope, Different schools of management – Behavioral Scientific System, Contingency.

Management theories by - F. W. Taylor, Henry Fayol and Elton Mayo.

Introduction to OB, significance of OB, Emerging challenges, Characteristics historical evolution and competencies of OB. Perception.

Unit - II

Individual Behavior: Managerial implications of Learning, Personality, Motivation and Job Stress.

Managerial Skill and Functions - Level of Management- Functions of Management

Unit – III

Personality – Development of personality, Attributes of personality.

Leadership – Definition, Importance, qualities of leaders, types of leaders– autocratic, democratic.

Group Behavior: Group Dynamics and Team Behavior, Organizational Conflict, Communication, Leadership, Managerial Implications of Group Behavior.

Unit – IV

Organizational Behavior: Organizational Structure, Organizational Power and Politics.

Total Quality Management, Case Study.

Organizational Culture, Organizational Change and Development.

Recommended BOOKS :

1. Stephen Robbins, “Organizational Behavior”. Prentice Hall India Pvt. Ltd New Delhi.
 2. Don Hellriegel, John Slocum, Richard Woodman, “Organizational Behavior” South-Western Thompson Learning.
 3. Fred Luthans, “Organizational Behavior”. McGraw Hill Book Company.
 4. Keith Davis, “Organizational Behavior”, Tata McGraw Hill Publishing Co. Ltd.
 5. Ricky Griffin & Georgy Moorehead, “organizational Behavior”, Hough Co. Boston.
 6. Steven McShane & Van Glinar, “Organizational Behavior”, Tata McGraw Hill Publishing Co. Ltd.
- Stephen R. Covey, “The seven Habits of Highly Effective people”, Simon & Schuster.

Course No: MCA-609-EA

Course Title : Research Methodology

UNIT -I

Research methodology: An Introduction Objectives of Research, Types of Research, Research Methods and Methodology, Defining a Research Problem, Techniques involved in Defining a Problem. Research Design Need for Research Design, Features of Good Design, Different Research Designs, Basic Principles of Experimental Designs, Sampling Design, Steps in Sampling Design, Types of Sampling Design, Sampling Fundamentals, Estimation, Sample size Determination, Random sampling.

UNIT II

Measurement and Scaling Techniques Measurement in Research, Measurement Scales, Sources in Error, Techniques of Developing Measurement Tools, Scaling, Meaning of Scale, Scale Construction Techniques, Methods of Data Collection and Analysis Collection of Primary and Secondary Data, Selection of appropriate method Data Processing Operations, Elements of Analysis, Statistics in Research, Measures of Dispersion, Measures of Skewness, Regression Analysis, Correlation.

UNIT III

Techniques of Hypotheses, Parametric or Standard Tests Basic concepts, Tests for Hypotheses I and II, Important parameters limitations of the tests of Hypotheses, Chi-square Test, Comparing Variance, As a non-parametric Test, Conversion of Chi to Phi, Caution In using Chi-square test.

UNIT IV

Analysis of Variance and Co-variance ANOVA, One way ANOVA, Two Way ANOVA, ANOCOVA Assumptions in ANOCOVA, Multivariate Analysis Technique Classification of Multivariate Analysis, factor Analysis, R-type Q Type factor Analysis, Path Analysis

REFERENCE BOOKS:

1. "Research Methodology", C.R. Kothari, Wiley Eastern.
2. "Formulation of Hypothesis", Willkinson K.P, L Bhandarkar, Hymalaya Publication, Bombay.
3. "Research in Education", John W Best and V. Kahn, PHI Publication.
4. "Research Methodology- A step by step guide for beginners", Ranjit Kumar, Pearson Education
5. "Management Research Methodology-Integration of principles, methods and Techniques", K.N. Krishna swami and others, Pearson Education

MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

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