Structure of MCA Syllabus

SEMESTER I	
CS 101	C-Programming
CS-102	Computer Architecture
CS-103	Mathematical Foundation
CS-104	Business Communication (Departmental)
CS-105	Graph Theory
CS-106	Elective I 1.Problem Solving Techniques 2. Numerical Methods. 3.Multimedia
CS-107	General Laboratory I (Departmental) (Assignments in C-Programming)
SEMESTER II	
CS-201	Data and File Structures using C
CS-202	Theoretical Computer Science
CS-203	Object Oriented Programming (C^{++} Programming)
CS-204	Software Engineering (Departmental)
CS-205	Database Management Systems
CS-206	Elective-II 1. E-Commerce 2. Operations Research 3. Accounts and Financial Management.
CS-207	General Laboratory II (University) (Assignments in Data Structures, Databases and C^{++})

SEMESTER III	
CS-301	Design and Analysis of Algorithm
CS-302	Networks
CS-303	Systems Programming and Operating Systems,
CS-304	Core Java (Departmental)
CS-305	SDK
CS-306	Elective III 1. Cyber Law 2. Artificial Intelligence 3. Computer Graphics.
CS-307	General Laboratory III (Departmental) (Assignments in System Programming, O.S. and Java and a project in SDK)
SEMESTER IV	
CS-401	UNIX
CS-402	Advance Networking and Mobile computing
CS-403	Distributed Databases
CS-404	Advanced Java (Departmental)
CS-405	Design Patterns.
CS-406	Elective IV 1. Modeling and Simulation 2. Embedded Systems. 3. MFC
CS-407	General Laboratory IV (University) (Assignments on Unix and Mobile Computing and a project in Java)

SEMESTER V	
CS-501	Information System Security
CS-502	Internet Programming.
CS0503	Object Oriented Software Engineering
CS-504	Data Warehousing and Mining (Departmental)
CS-505	Software Testing and Quality Assurance.
CS-506	Elective IV- 1. Current Trends and Technology 2. Expert System 3. Foreign Language 4. System Administration
CS-507	General Laboratory (Departmental) (Assignments on Testing and a project on Internet Programming)
SEMESTER VI	
CS-601	Full Time Industrial Experience (University)

MCA Sem I
Subject: CS-101 C Programming

1. Introductory Concepts [2 Lectures]
   Overview of programming and programming languages
   Types of programming Languages.
   Introduction to C
   Features of C
   Structure of C program

2. C Fundamentals [2 Lectures]
   2.1 C Character Set
   2.2 Identifiers and Keywords
   2.3 Variables and constants
   2.4 Data types
      2.4.1 Basic data types
      2.4.2 Enumerated types
      2.4.3 Type casting
   2.5 Declarations
   2.6 Expressions

3. Operators and Expressions [4 Lectures]
   3.1 Unary plus minus operators
   3.2 Binary arithmetic operators
   3.3 Increment Decrement operators
   3.4 Relational and logical operators
   3.5 Bit wise operators
   3.6 Assignment operator
   3.7 Comma operator, sizeof operator, ternary conditional operator.
   3.8 Precedence and Associativity
   3.9 Library Functions

4. Data Input output statements [2 Lectures]
   4.1 printf, scanf functions
   4.2 getchar, putchar, getch, getche functions
   4.3 gets, puts functions
   4.4 Escape sequence characters
   4.5 Format specifiers

5. Control Statements [5 Lectures]
   5.1 If , If- Else statements
   5.2 Nested If statements
   5.3 Conditional Branching – switch statement
   5.4 Loops (while, do-while, for)
   5.5 break, continue, goto statements
6. Functions [8 Lectures]
   6.1 Declaration (Prototyping)
   6.2 Function call, function header and definition
   6.3 Passing arguments (Actual and formal arguments)
   6.4 Recursion
   6.5 Scope of variable (local/global)
   6.6 Storage classes : auto, static, extern, register.
   6.7 Library Functions.

7. Arrays [5 Lectures]
   7.1 Defining an array
   7.2 Processing an array
   7.3 Multi dimensional arrays
   7.4 Strings

8. Pointers [10 Lectures]
   8.1 Fundamentals
   8.2 Pointer declaration
   8.3 Passing pointers to function (call by value/ call by reference)
   8.4 Operations on pointers
   8.5 Pointer to an array.
   8.6 Dynamic memory allocation
   8.7 Array of pointers
   8.8 Function pointers

9. Structures and unions [5 Lectures]
   9.1 Defining structure and union
   9.2 Processing structure and union
   9.3 User defined data types (typedef)
   9.4 Pointer to structure
   9.5 Self referential structures

10. Files [6 Lectures]
   10.1 Opening and closing file

10.2 Creating files
10.3 Processing files
10.4 File handling using command line arguments
10.5 Library functions for file handling.

11. C Preprocessor [2 Lectures]

12. Graphics using C [internal] [3 Lectures]
11.1 VDU Basics
11.2 Simple library functions (getpixel, putpixel, line, rectangle, circle, ellipse, arc)

Text Books:
Programming with C : Bryon Gottfried
Let us C : Yashwant Kanetkar.

Reference Boos:
C programming : Dennis Ritchie
Programming in ANCI C : Balgurusamy
Graphics under C : Yashwant Kanetkar
Pointers in C : Yashwant Kanetkar

MCA Sem-I
Subject CS-102 Computer Architecture

1. Digital Logic Circuit [7 lectures]

i. Logic gates
ii. Combinational circuit
- Half Adder
- Full adder

iii. Flip- flops
- SR Flip flop
- D Flip flop
- JK Flip flop
- T Flip flop
- Edge Triggered Flip flop

iv. Digital components
- Decoder & encoder
- Multiplexer & de multiplexer
- Shift Registers
- Counters

(Ripple counters & Synchronous counters)

2. Microprocessors [5 lectures]

i. Components of microprocessor
ii. Real mode & protected mode
iii. Processor Register
iv. Addressing modes and opcode concept
v. Interrupts
vi. Bus formats and operation
vii. Construction of instruction word and instruction cycle and execute cycle

3 Interfaces [6 lectures]

i. Introduction to interfaces
ii. Buses for interfaces
- ISA

- EISA
- PCI
- VESA
- USB

4 I/O Interfaces [12 lectures]

i. Block dig. of I/O interface
ii. Serial communication interfaces
iii. Asynchronous communication and synchronous communication
iv. Parallel communication
v. 8255A programmable peripheral interface(dig of 8255A)
vi. DMA controller
vii. Diskette controllers
viii. A to D converter
D to A converter
- Flash A to D converter
- Dual slope converter
- Successive approximation
- Binary weighted input D to A
- R/2R ladder D to A

5 Parallel processing [9 lectures]

i. Concept of parallel processing
- Parallism in uniprocessors
- Parallel computer structure

ii. Principles of pipelining
iii. Instruction arithmetic pipeline
iv. Vector processing
v. RISC pipelining

6 Processor Architecture [9 lectures]

i. Introduction to 80286 (Block dig.)
ii. Introduction to 80386/ 80486
iii. Pentinum-Pro microprocessor

(Internal structure)

iv. Arithmatic Coprocessors concept
Internal structure of 80 x 87

v. RISC and CISC

Reference Books:

1. Digital logic and computer design - Morris Mano
2. A modern digital Electronics - R. P. Jain
3. Digital Electronics - Bartee
4. Microprocessors & Interfacing - Douglas Hall
5. Computer Organization & Architecture - Carpinell
6. Intel Microprocessors - Bary Brey
7. Microcomputer systems- Architecture, Programming & Design - Yu-Chang liu & Glenn Gibson
8. Digital Fundamentals - Floyd
9. Computer Architecture & parallel Processing - Kai Hwang & Briggs
10. the Pentium Microprocessor - James Antonakes

MCA Sem I
Subject CS 103- Mathematical Foundation

1. SET THEORY [5 Lectures]

1.1 Sets, Subsets
1.2 Operations on Sets
1.3 De Morgan's Laws
1.4 Power Set of a Set
1.5 Cartesian Product
1.6 Equivalence relation
1.7 Partition of a Set
1.8 Partial order on a set

2. INTRODUCTION TO ALGEBRA

Relations [3 Lectures]

Ordered Pairs, Cartesian product of Sets.
Relations, types of relations, equivalence relations, Partial Ordering.
Equivalence Class, Properties of Equivalence Class.

Function [2 Lectures]

Definition of function as relation
Injective, Surjective function , Bijective function
Composition of two functions, Inverse Function

2.3 Divisibility of Integers [3 Lectures]

2.3.1 Definition and Properties
2.3.2 Division Algorithm
2.3.3 Divisibility and its properties
2.3.4 GCD, Euclidean Algorithm
2.3.5 Properties of GCD

2.4 Modular Arithmetic [5 Lectures]

2.4.1 Congruence relation
2.4.2 Application of congruence.
2.4.3 Modular exponentiation

2.4.4 Linear congruence
2.4.5 Chinese Remainder theorem (problem solving only)

2.5 Polynomials [3 Lectures]

2.5.1 Definition of polynomial, Equality, addition, multiplication of two polynomials
2.5.2 Divisibility in Polynomials, Properties of divisibility
2.5.3 GCD of two polynomials using Euclidean Algorithm
2.5.4 Roots of a polynomial

2.6 Permutation [3 Lectures]

2.6.1 Definition of permutation as a bijective function from $S \rightarrow S$, $S=\{1,2\ldots.n\}$
2.6.2 Multiplication of two polynomials
2.6.3 Cycle, transposition
2.6.4 Even and odd permutation

2.7 Binary Operation [3 Lectures]

2.7.1 Definition of binary operation
2.7.2 Properties of binary operations.
2.7.3 Composition table
2.7.4 Residue Classes
2.7.5 Binary operation on Zn

2.8 Groups [5 Lectures]

2.8.1 Definition of a algebraic system
2.8.2 Semi group
2.8.3 Monoid
2.8.4 Group
2.8.5 Abelian group
2.8.6 Properties of a group (without proof)
2.8.7 (Zn, +) as a group (without group)

2.9 Matrices [6 Lectures]

2.9.1 Definition of matrix
2.9.2 Matrix arithmetic
2.9.3 Transpose and powers of matrices
2.9.4 Symmetric matrix

2.9.5 Concept of Partition of a Matrix
2.9.6 Inverse of a matrix
2.9.7 Sparse matrices
2.9.8 Solving system of linear equations using
1) Cramer's rule
2) Inverse

3 PROPOSITIONAL CALCULUS [4 Lectures]

3.1 Propositions
3.2 Logical connections
3.3 Truth tables
3.4 Logical equivalence
3.5 Tautology and contradiction

4 PREDICATE CALCULUS [5 Lectures]

4.1 Predicates
4.2 Valid arguments and proofs.
4.2.1 Proofs using truth tables
4.2.2 Direct proof
4.2.3 Indirect proof
4.3 Quantifiers

Reference Books :

1. Discrete Mathematical Structures : Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Nadeen-Ur-Rehman.
2. Discrete Mathematics And Its Applications: Rosen
3. Applied Discrete Structures for Computer Science : Alan Doerr , Kenneth Levasseur.

MCA Sem I

Subject CS-104 BUSINESS COMMUNICATION(Departmental)

50 Lectures

I Language and Communication

- Linguistic Communication
- Barriers to Communication

II Oral Component

1. Non – Verbal Communication

- Personal Appearance
- Posture
- Gestures
- Facial Expression
- Eye Contact
- Space Distancing

2. Oral Communication

- Face to Face Communication
- Telephonic Conversation
- Interviews
- Instrucion
- Dictation

3. Seminars and Conferences

- Organisation – Use of Audio – visual Aids
- Oral Presentation

4. Group Discussion

- Group Dynamics
- Purposes

- Organization

III Written Communication

- Report Writing
  - i.) Commercial
  - ii.) Technical

- Business Correspondence

  a) Business Letters

  - i.) Purpose
  - ii.) Structure
  - iii.) Layout
  - iv.) Types

- Job Application and Resume Writing
- Notices Agenda and Minutes
- Advertisements

  - i.) Billboards
  - ii.) Hard bills
  - iii.) Pamphlets
  - iv.) Copywriting

- Manuals

  - i.) Research Papers
  - ii.) Research Articles
  - iii.) Graphic aids

  Tables, Figures ,Graphics Pie Charts, Flow Charts

- Web Correspondence

  e-mail, fax, etc.

Reference Books:-

1. Principles and Practices of Business Communications

   Aspi Doctor
   Rhoda Doctor
2. Developing Communication Skills

   Krishna Mohan
   Meera Banerji

3. A Handbook of Communication Skills in English

   Prin. R.A.Kulkarni
4. Business Communication – Building Critical Skills

   Kitty O Locker
   Stephen Kyo Kaczmarek
5. Business Communication Today- Bovee , Thill Schatzman
6. Business Correspondence and Report Writing

   R.C.Sharma
   Krishna Mohan
7. Communication Skills

   Dr. Nageshwar Rao
   Dr. Rajendra.P.Das

M.C.A.Sem –I
Subject CS-105 Graph Theory

1 Introduction to graphs [4 Lectures]

1.1 Definition of graph, Parallel edge, Loop.Chapter 1 sec1.1 (Narsingh Deo)
1.2 Applications of Graphs: Konigsberg Problem, Utilities Problem, Electrical Problems, Seating Problems Chapter 1 (sec1.2 (Narsingh Deo))
1.3 Definitions: Isolated Vertex ,Pendant Vertex, Incidence and Degree Chapter 1 sec1.4 and 1.5 (Narsingh Deo)
1.4 Types of Graphs: Simple Graph, Regular Graph, Bipartite Graph, Complete and Null Graph. Chapter 1 sec1.3 and 1.4 (Clark and Holton)
1.5 Elementary results: Hand Shaking Lemma Theorem 1.1 and Corollary 1.2 (Chapter 1 Clark and Holton)(with Proof)
1.6 Definition of Graph Isomorphism and Examples (Chapter 1 sec1.3 (Clark and Holton))
1.7 Matrix Representation
1.7.1 Adjacency matrix
1.7.2 Incidence matrix (Definition Only)
Chapter 1 sec 1.7 (Clark and Holton)

2 Subgraph [5 Lectures]

2.1 Definition of Subgraph, Supergraph, Spanning Graph, Vertex deleted, Edge deleted subgraph, Underlying Simple Graph. Chapter 1 sec 1.5(Clark and Holton)
2.2 Definition of Complement of Graph and Self Complementary graph. Chapter 1(Solve Exercise 1.5.2,1.5.3)(Clark & Holton)
2.3 Induced Subgraphs: Edge Induced and Vertex Induced Chapter 1 sec 1.5(Clark and Holton)
2.4 Operations on Graphs: Union of two graphs, Intersection of two graphs. Chapter 1 sec 1.5(Clark and Holton), Ring Sum of two graphs and composition. Chapter 2 Sec 2.7 (Narsingh Deo)
2.5 Definition of Edge Disjoint and Vertex Disjoint Subgraphs. Chapter 2 Sec 2.2(Narsingh Deo)

3 Connected Graphs [8 Lectures]

3.1 Walk, Path, Circuits. Chapter 2 Sec2.4 (Clark and Holton) Definition Only.

3.2 Definition of Connected and Disconnected Graph. Chapter 2 Sec2.5 (Clark and Holton) Theorem 2.1 and 2.2 (with proof) ,Theorem 2.3(statement only)

3.3 Fusion of vertices and Fusion Algorithm for Connectedness. Chapter 1 Sec 1.8 (Clark and Holton)

3.4 Definition of Isthmus (Bridge) Theorem 2.7(statement only), Chapter 2 Sec 2.2(Clark and Holton)

3.5 Cut Vertex and Connectivity

3.5.1 Vertex connectivity

3.5.2 Edge connectivity (Definition and examples only) Chapter 4 sec 4.5 (Narsingh Deo) Thm4.7 (statement only) its Application

4 Eulerian and Hamiltonian Graph [6 Lectures]

4.1 Definition of Euler Trail,Euler Tour and Eulerian Graph Chapter 3 sec 3.1(Clark and Holton) Thm 3.2(with proof)

4.1.1 Chinese Postman Problem (Chapter 3 sec 3.2 (Clark and Holton))

4.1.2 Fleury's Algorithm (Chapter 3 sec 3.1(Clark and Holton))

4.2 Definition of Hamiltonian Path, Hamiltonian Cycle and Hamiltonian Graph Chapter 3 Sec 3.3 (Clark and Holton) Thm3.6,thm 3.8 (Statement only)

4.2.1 Introduction to Traveling Salesman Problem. Chapter 3 Sec 3.4 (Clark and Holton)

5 Directed Graph. [4 Lectures]

5.1 Definition of directed Graph, Chapter 9 sec 9.1 (Narsingh Deo) Types of Directed Graph: Symmetric, Asymmetric, and Complete Digraphs(definition) Chapter 9 sec 9.2 (Narsingh Deo)

5.2 In Degree and Out Degree(Definition Only)

5.3 Directed Paths and Connectedness of Digraphs Weakly Connected and Strongly Connected
Chapter 9 sec 9.4(Narsingh Deo)

6 Trees [12 Lectures]

6.1 Definition of a Tree.
6.2 Center of a Tree
6.3 Rooted and Binary Trees Chapter 3 sec 3.1,3.4,3.5
Theorem 3.4,Theorem 3.9 (with proof) (Narsingh Deo)
6.4 Tree Traversal
6.4.1 Inorder and Post Order (Algorithms)
6.4.2 Infix, Prefix and Postfix
6.5 Definition of Spanning Tree
6.5.1 Definition of Branch and Chord
Chapter 3 sec 3.7 (Narsingh Deo)
6.5.2 Fundamental Circuit and Fundamental Cutsets
Chapter 3 sec 3.8 (Narsingh Deo)
6.5.3 Algorithms for finding spanning Tree
6.5.4 Depth-First Search or Back Tracking
6.5.5 Breadth-First Search
6.6 Definition of Minimum Spanning Tree
6.6.1 Algorithms for finding Minimum Spanning Tree
6.6.2 Kruskal's Algorithm
6.6.3 Prim's Algorithm
Chapter 9 Sec 9.3,9.4 and 9.5(Rosen)

6.7 Arborescence and Polish Notation

7 Weighted Graph [4 Lectures]

7.1 Definition of a Weighted Graph
7.2 Shortest Path in Weighted graph (Dijkstra's Algorithm)
Chapter 2 sec 2.5 (Clark and Holton)

8 Recurrence Relation and Generating Functions [8 Lectures]

8.1 Introduction to Recurrence Relation and Modeling of Recurrence relation

8.2 Solving Linear Recurrence Relation with Constant Coefficient(using substitution method)
8.3 Generating function Ordinary generating function and Exponential generating function
8.4 Solving Recurrence relation using Generating Function
8.5 Application of Recurrence relation and Generating Function to solve problems in Combinatorics be covered.(**Internal**) Chapter 6 (Rosen)

Reference books

1. Graph theory with applications to Engineering and computer science by Narsingh Deo.

2. Discrete Mathematics by Rosen.

3. Graph theory by John Clark and Derek Allan Holton

4. Reference Book Allan Tucker for Combinatorics

MCA Sem-I

Subject CS 106-Elective I

Problem Solving and Algorithms

Pre requisite**:** Basic Mathematics

Objectives**:** To develop Analytical / Logical Thinking and Problem Solving capabilities

Ch.1 Introduction [5]

- 1.1 Concept: problem solving, algorithm
- 1.2 Program development cycle
- 1.3 Characteristics of an algorithm
- 1.4 Time complexity: Big-Oh notation
- 1.5 Flowcharts
- 1.6 Simple Examples: Algorithms and flowcharts

Ch. 2 Simple Arithmetic Problems [13]

- 2.1 Addition / Multiplication of integers
- 2.2 Determining if a number is +ve / -ve / even / odd
- 2.3 Maximum of 2 numbers, 3 numbers
- 2.4 Sum of first n numbers, given n numbers
- 2.5 Integer division, Digit reversing, Table generation for n, a^b
- 2.6 Factorial, sine series, cosine series, ${}^nC_r$, Pascal Triangle
- 2.7 Prime number, Factors of a number

2.8 Other problems such as Perfect number, GCD of 2 numbers etc

(Write algorithms and draw flowcharts)

Ch. 3 Recursion [8]

3.1 Concept

3.2 Multiplication

3.3 Factorial

3.4 Ackerman function

3.5 Fibonacci series

3.6 Permutation Generation

Ch. 4 Algorithms using arrays [8]

4.1 Maximum and minimum of array, reversing elements of an array

4.2 Mean and Median of n numbers

4.3 Row major and Column major form of array representation

4.4 Matrices: Addition, Multiplication, Transpose, Symmetry, upper/lower triangular

Ch. 5 Sorting and Searching [13]

5.1 Insertion sort

5.2 Bubble sort

5.3 Selection sort

5.4 Quick sort (Recursive)

5.5 Merge sort

5.6 Radix Sort

5.7 Bucket Sort

5.8 Counting Sort

5.9 Sequential and Binary search

(Performance Analysis for space requirement and speed using Big-Oh notation is essential)

Reference Books:

1. How to solve it by Computer – R. G. Dromy
2. Fundamentals of Data Structures – Horowitz and Sahani
3. Introduction to algorithms – Cormen, Leiserson, Rivest, Stein

MCA Sem-I

Subject CS-106 Elective-I

Numerical Methods

1. Solutions to algebraic and transcendental equations [8 Lectures]
   1.1 Bisection Method
   1.2 Secant Method
   1.3 Regula Falsi Method
   1.4 Newton Raphson Method
   1.5 Iterative Or Successive Approximation Method
   1.6 Comparison Of Iterative Method

2. System Of Linear Equations [10 Lectures]
   2.1 Gauss Elimination Method
   2.2 Gauss Jordan Elimination Method
   2.3 Triangularization Or LU Decomposition Method
   2.4 Jacobis Iteration Method
   2.5 Gauss Seidel Iterative Method
   2.6 ILL Conditioned System
   2.7 Comparison And Choice Of Methods

3. Interpolation And Polynomial Approximation [12 Lectures]
   3.1 Finite Difference Operators
   3.2 Forward And Backward Differences
   3.3 Interpolation Techniques Based On Finite Differences
      - Newton's Forward Difference Interpolation Method
      - Newton's Backward Difference Interpolation Method
      - Error In Polynomial Interpolations
   3.4 Lagrange's Interpolation
   3.5 Spline Interpolation
   3.6 Least Square Approximation

4. Numerical Integration [6 Lectures]
   4.1 Trapezoidal Rule
   4.2 Simpson's $1/3^{rd}$ Rule
   4.3 Simpson's $3/8^{th}$ Rule
   4.4 Errors In Integration Formulae

5. Solutions To Ordinary Differential Equation [6 Lectures]
   5.1 Taylor Series Method.
   5.2 Euler's Method
   5.3 Modified Euler's Method
   5.4 Runge Kutta Methods
   5.5 Predictor Corrector Formula

6. Errors In Numerical Computations [3 Lectures]
   6.1 Floating Point Numbers
   6.2 Types Of Errors
   6.3 Analysis And Estimation Of Errors
   6.4 Error Propagation

Reference Books:

Computer Oriented Numerical Methods By- V. Rajaraman
Computational Techniques – J.S.Chitode

MCA (Sem-I)
Subject CS-106 Elective I
Multimedia Systems

1. Uses of Multimedia Information [4 lectures]
1.1 Introduction
1.2 What is multimedia?
1.3 Early Hypertext and Collaborative Research
1.4 Multimedia and Personalized computing
1.5 Multimedia on the Map
1.6 Multimedia systems: The challenges

2. The convergence of Computers, communications and entertainment Products [2 lectures]
2.1 Technology Trends
2.2 Multimedia Appliances: Hybrid Devices
2.3 A designers view of Multimedia Appliances
2.4 Industry Perspectives for the next decade

3. Digital Audio Representation and Processing [8 lectures]
3.1 Uses of Audio in computer applications
3.2 Psychoacoustics
3.3 Digital Representations of sound
3.4 Transmission of digital sound
3.5 Digital Audio signal Processing
3.6 Digital music making

4 Video Technology [8 lectures]
4.1 Raster Scanning Principles
4.2 Sensors for TV Cameras
4.3 Color Fundamentals
4.4 Color Video
4.5 Video Performance Measurements
4.6 Analog Video Artifacts
4.7 Video Equipment
4.8 World wide Television Standards

5 Digital Video and Image Compression [10 lectures]
5.1 Evaluating a compression System
5.2 Redundancy and Visibility

5.3 Video compression techniques
5.4 Standardization of algorithms
5.5 The JPEG Image compression standards
5.6 ITU-T Recommendation H.261 (p*64)
5.7 The MPEG Motion Video Compression Standards
5.8 DVI Technology

6 Time Based Media Representation and Delivery [2 lectures]
6.1 Models of time
6.2 Time and Multimedia Requirements
6.3 Support for System timing Enforcement - Delivery

7 Operating Systems support for continuous Media Applications [3 lectures]
7.1 Introduction
7.2 Limitation in Workstation Operating System
7.3 New Operating System support
7.4 Experiments using Real- Time Mach

8 Middle Systems Services Architecture [3 lectures]
8.1 Goals of Multimedia Systems Services
8.2 Some views of the Multimedia Systems Services Architecture
8.3 Media Stream Protocol
8.4 E. G.: Audio and Video Capture with Synchronized Play

9 Multimedia Devices Presentation Services and User Interface [8 lectures]
9.1 Multimedia services and the Window system
9.2 Client control of continuous media
9.3 Device control
9.4 Temporal Coordination and Composition
9.5 Toolkits
9.6 Hyper application

10 Multimedia Interchange [6 lectures]
10.1 QuicktTime Movie File (QMF) format
10.2 OMFI
10.3 MHEG (Multimedia and Hypermedia Information Encoding Expert Group)
10.4 Format Function and Representation Summery

10.5 Track model and Object Model
10.6 Real-Time Interchange
10.7 Towards a Performance Model

11 Multimedia Conferencing [4 lectures]
11.1 Teleconferencing system
11.2 Requirements for Multimedia communication
11.3 Shared Application Architectures and Embedded Distributed Objects
11.4 Multimedia conferencing Architecture

Reference Books

Multimedia Systems - John F. Koegel Buford

Multimedia Computing Communications and Applications – Steinmetz

Multimedia in Practice - Jeffcoate.

MCA Sem-II

Subject CS 201: Data and File structures Using C

1. Introduction to Data Structure [2 Lectures]

Data types
Abstract Data types
Arrays
Arrays as abstract data type
Arrays row major and column major
Sequences
Big Oh notations.

2. Stack [5 Lectures]

Definition and Example
Representing Stack using static implementation
Applications
Infix, Prefix and postfix
Converting infix to postfix
Expression Evaluation
Matching parentheses
Recursion and Simulating Recursion

3. Queues [4 Lectures]

Definition and examples
Representing Queues using static implementation
Circular queues
Priority queues
Double-ended queues

4. Linked Lists [12 Lectures]

List Types (singly, doubly, singly circular, doubly circular)
Operations on all types of Lists – create, insert, delete
Generalized Lists
Applications
Dynamic implementation of stack and queues
Polynomial Addition
Dynamic Memory Allocation – First- Fit, Best – Fit, Worst-fit

5. Trees [6 Lectures]

Concept
Rooted Tree
Binary Tree – Linked and static Representation
Tree Traversals (Pre-order, In-order, Post-order using recursion)
Binary Search Tree (create, delete, search, insert, display)
AVL Trees

6. Graphs [4 Lectures]
Representation using C
Adjacency matrix and adjacency lists
BFS and DFS by static and dynamic implementation
6.4 Finding shortest path (Dijkstra's Algorithm)

7. Searching [3 Lectures]
Sequential
Binary
Hashing
Hash tables
Hash functions
Overflow handling techniques

8. Sorting [6 Lectures]
Bubble sort
Insertion sort
Quick sort (recursive)
Merge sort
Heap sort
Bucket sort

9. File structures [8 lectures]

Indexing (primary, secondary, clustered, unclustered, dense, sparse)
Hash index

B+ trees and ISAM

Text Books:

1. Data Structures Using C – Aaron Tenenbaum

2. Database Management Systems – Ramkrishnan Gehrke (McGraw Hill Third Edition)

Reference Books:

2. Fundamentals of data structures – Ellis Horowitz and Sartaj Sahni
3. Data Structures Files and Algorithms – Abhay K. Abhyankar
4. Data Structures and Algorithms – Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman (Pearson Education)
5. Database System Concepts – Abraham Silberschatz, Henry F. Korth, S. Sudarshan (McGraw Hill Fifth Edition)

Subject CS-202 : Theoretical Computer Science

1. Preliminaries [3 Lectures]
   - Symbol, Alphabet, String, Prefix& & Suffix of Strings, Sets, Operations on sets, Finite & infinite sets Formal Language
   - Relation, Equivalence Relation,(reflexive, transitive and symmetric closures)
   - Principle of Induction
2. Regular Languages [16 Lectures]
   - Regular Expression: Definition, Examples, & Identities
   - Finite Automata: Concept
     - DFA: Definition & examples
   - NFA: Definition, examples, Language accepted By FA, NFA with $\in$ - moves
     Regular Expression to FA: Method and Problems

     NFA with $\in$ - moves to NFA,
     NFA to DFA: Method Problems
   - Minimization of DFA: Problem using Table Method
   - FA with output: Moore & Mealy Machines: Definition and their equivalence
   - Application of FA: Pumping Lemma & Examples
   - Closure Properties: Union, Intersection, Concatenation, Complement, & Kleene Closure
3. Context Free Languages [17 Lectures]
   Chomsky Hierarchy
   - CFG : Definition & examples
   - Ambiguous Grammar : Concept & Examples
   - Simplification of CFG : Removing Useless Symbols, removing unit productions and removing Nullable symbols : Methods & Problems
   - Normal Forms : CNF & GNF : Method & Problems
   - Regular Grammar : Definition ,Equivalence of

FA & Regular Grammar

- PDA : Basic Concept , Definition (DPDA & NPDA)
- Construction of PDA using empty stack and final State method : Examples using stack method
- Equivalence between acceptance by final state And Empty stack method & examples
- Equivalence between PDA & CFG (in GNF): Method and examples

4. Properties of Context Free Languages [2 Lectures]
   - Pumping Lemma for CFL : methods & problems
   - Closure Properties of CFL's(Union, Concatenation, & Kleene Closure) : Method & Examples)

5. Turing Machine [10 Lectures]
   - Recursive & recursively enumerable language
   - Introduction to LBA (Basic Model) & CSG.
   - Definition Of TM,
   - Design of TM for language recognition
   - Types of Turing Machine (Multitape TM, NonDeterministic TM, Universal TM, Restricted TM)
   - Undecidable Problem, Halting Problem of TM

References:

1. Introduction to Automata Theory , Languages ,And Computation (2nd Edition Pearson education) By –John E. Hopcroft , Rajeev Motwani, Jeffrey D. Ullman
2. Introduction to Computer Theory By - Daniel I.A. Cohen (John Wiley & Sons (ASIA) Pre Ltd. 2nd Edition)
3 Theory of Computer Science (Automata Languages And Computation By – K.L.P.Mishra & N. Chandrasekaran (Prentice –Hall India 2 nd Edition)
4. An Introduction to the Theory of Computer Science Languages & Machine (3rd Edition Pearson education) By Thomas A. Sudkamp

5. Introduction to Languages and the theory of Computation
   By – John C.Martin (Tata McGraw –Hill Edition, 2nd Edition)
6. Theory of computer science by Jeffery-U

Introduction to iterators
Iterators and sequences
Checked Iterators
Introduction to allocators (standard ,user-defined, generalized)

Object Orientation Concepts [2 Lectures]
Object Oriented Methodology
Features, Application and Advantages of OOP's

Tour of C++ [3 Lectures]
What is C++
Programming Paradigms
Procedural Programming
Modular Programming
Data Abstraction
Generic programming

Basic Facilities [8 Lectures]

Data Types, new operators and keywords, Type conversions in C++, reference variables, arrays etc.
Classes and Objects
Classes and Access Specifiers
Defining data members and member functions
Array of objects
Usage of namespace
Managing Console I/O
Usage of Manipulators

Usage of Constructors and Destructors

Functions in C++ [5 Lectures]
Call by reference, return by reference
Function overloading
Inline Functions
Friend Functions
Static class members

Operator Overloading [4 Lectures]

Overloading unary and binary operators
Usage of this pointer
Overloading using friend functions
Overloading “<<” and “>>” operator

Inheritance [7 Lectures]
Introduction
Types of Inheritance
Base class and derived class examples
Virtual base class
Abstract class
Virtual functions and pure virtual functions

Exception handling [6 Lectures]
Error Handling , Error Handling Alternatives
Exception Specification (i.e. Usage of Try, Catch, Throw etc.)
Exception in Constructors & Destructors
Uncaught Exceptions
Standard Exceptions

Files [3 Lectures]
File Operations (fstream, ifstream, ofstream)
File pointers and their manipulation
File Updation with random access

Templates [6 Lectures]
Defining templates
Function templates
Derivations and templates
Examples of templates

Iterators & Allocators [6 Lectures]

Reference Books :

1) The C++ Programming Language - Bjarne Stroustrup
2) Thinking in C++ - Bruce Eckel
3) Object Oriented Programming (C++) – Balaguruswamy
4) C++ Programming Today – Barbara Johnstron
5) Problem Solving with C++ - Walter Savitch

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MCA Sem-II

Subject CS-204 Software Engineering(Departmental)

1. Introduction To Software Engineering [4 Lectures]
    a. Definition
    b. Characteristics of A Software
    c. Mc Call's Quality Factors.

2. Software Development process [10 Lectures]
    a. SDLC
    b. Waterfall Model, Spiral Model, prototyping approach, 4GL approach.
    c. Requirement Analysis.
        i. Definition of System Analysis.
        ii. Role of system analyst
        iii. Requirement anticipation, investigation and specification
        iv. Feasibility study,
        v. Fact finding techniques-interview, quetionnair, record review, observation.

3. Analysis and design tools. [8 Lectures]
    a. E-R analysis
    b. Decision tree and decision tables
    c. DFD (physical and logical)
    d. Data dictionary-definition, component, advantages
    e. Input and output design
    f. Case studies(atleast 4 should be covered)

4. System design
    a. Qualities of good design [2 Lectures]

5. System testing [8 Lectures]
    a. Testing and debugging definition
    b. Testing objectives and principles
    c. Performance testing
    d. User acceptance techniques
    e. Stress testing
    f. Test data generators.

6. System maintenance. [4 Lectures]

a. Importance of maintenance
b. Software maintenance
c. Types of maintenance
d. Maintenance side effects.
e. Reverse engineering
f. Re-engineering

7. Concept of software management [6 Lectures]

a. The software crisis,
b. Principles of software engineering,
c. Programming in small vs. programming in large.
d. Software measurement.

8. Project management [10 Lectures]

a. relationship of life cycle
b. project planning , project control
c. project organization
d. risk management
e. cost models
f. configuration management
g. version control
h. quality assurance
i. Metrics.

Reference Books :

Software Engineering – Pressman
Analysis and Design of Information System – James Seann
System Analysis and Design – Parthsarthy – Khalkar.

MCA SEM-II
Subject CS 205:Database Management System

1. Database Management System [8 lectures]
    - Database System Application
    - Database System Vs File System
    - View Of Data
    - Data Models
    - Database Languages
    - Database Users And Administrators
    - Transaction Management
    - Database System Structure
    - Application Architecture
    - History Of Database System

2. Entity Relationship model [8 Lectures]
    - Basic Concepts
    - Constraints,
    - Keys,
    - Design Issues
    - E-R Diagram
    - Weak Entity Sets
    - Extended E-R Features
    - Design Of E-R Database Scheme

3. Relational model
    - Structure Of Relational Database [2 Lectures]
    - Views

4. SQL [12 Lectures]
    - Background
    - Basic Structure
    - Set Operations

- Aggregate Functions
- Null Values
- Nested Subqueries
- Views
- Complex Queries
- Modification Of Database
- Joined Relations
- DDL, Embedded SQL
- Other SQL Features
- Query By Example
- Datalog
- User interfaces And Tools
- Integrity And Security Constraints
- Referential Integrity
- Assertions
- Triggers
- Security And Authorization
- Authorization In SQL
- Encryption And Authentification

5. Relational Database design [8 Lectures]
    - First Normal Form
    - Pitfalls In RDB Design
    - Functional Dependencies
    - Decomposition
    - Desirable Properties Of Decomposition
    - Boyce-Codd Normal Form,
    - Third, Fourth Normal Form
    - More Normal Form
    - Overall Database Design Process
    - Query Processing Overview
    - Measures Of Query Cost Selection Operation
    - Query Optimization

6. Transactions [6 Lectures]
    - Transaction Concepts
    - Transaction State,
    - Implementation Of Atomicity And Durability
    - Concurrent Executions
    - Serilizability
    - Recoverability
    - Implementation Of Isolation, Transaction Definition In Sql.

7. Concurrency control [4 Lectures]
    - lock-based protocols
    - timestamp-based protocols
    - validation based protocols
    - multiple granularity
    - deadlock handling
    - insert, delete operation
    - weak level of consistency

Reference books

1. Database system by Korth TMH
2. Fundamentals of Database Systems by Navathe

MCA SEM II

Subject CS 206: Elective II

Operations Research

1. The Nature of OR, history, meaning. [2 Lectures]

2. [10 Lectures]
   - 2.1 Linear Programming-Introduction
   - 2.2 Formulation of a LP Model
   - 2.3 Graphical Solution of a LPP
   - 2.4 Simplex Method

3. [10 Lectures]
   - 3.1 Duality theory and applications
   - 3.2 Dual Simplex Method
   - 3.3 Sensitivity analysis in LP

4. [8 Lectures]
   - 4.1 Transportation Problem
   - 4.2 Assignment Problem

5. Introduction to Game Theory [4 Lectures]

6. Multiobjective Optimization and Goal Programming [4 Lectures]

7. Project Scheduling by PERT-CPM [8 Lectures]

Reference Books:

1. Operations Research: H.A.Taha
2. Operations Research: V.K.Kapoor

MCA Sem II
Subject CS 206 Elective II
E-Commerce

1 Introduction to Electronic Commerce [4 Lectures]

- What is E-Commerce (Introduction and Definition)
- Main activites E-Commerce
- Goals of E-Commerce
- Technical Components of E-commerce
- Functions of E-commerce
- Adv / Dis Adv of E-commerce
- Scope of E-commerce
- Electronic commerce Applications
- Electronic commerce and Electronic Business(C2C) (2G , G2G , B2G , B2P ,B2A,P2P,B2A,C2A,B2B,B2C)

2 The Internet and WWW [3 Lectures]

- Evolution of Internet
- Domain Names and Internet Organisation(.edu , .com , .mil .gov , .net etc)
  - ❖ Types of Network(LAN , MAN, WAN)
  - ❖ Internet Service provider
  - ❖ World wide web

3 Building own website [3 Lectures]

- Reasons for building own website
- Benefits of website
- Cost , Time , Reach
- Registering a Domain Name
- Web promotion
- Target email , Baner Exchange , Shoping Bots

4 Internet Security [8 Lectures]

- Secure Transaction
- Computer Monitoring
- Privacy on Internet

- Corporate Email privacy
- Computer Crime (Laws , Types of Crimes)
- Threats
- Attack on Computer System
- Software Packages for Privacy
- Hacking
- Computer Virus (How it spreads , Virus problem , Virus protection
    - Encryption and Decryption
    - Secret key Cryptography
    - DES
    - Public key Encryption
    - RSA
    - Authorisation and Authentication
    - Firewall
    - Digital Signature (How it works)

5 Internet and Extranet [6 Lectures]

- Def inition of Internet
- Adv and Dis adv of the Internet
- Component of a Intranet Information technology structure
- Development of a Intranet
- Extranet and Intranet Difference
- Rloe of Intranet in B2B Application

6 Electronic Data Interchange [4 Lectures]

- Introduction
- Concepts of EDI and Limitation
- Application of EDI
- Disadvantages of EDI
- EDI model

7 Electronic payment System [6 Lectures]

- Introduction
- Types of Electronic payment system
- Payment types
- Traditional payment

- Value exchange system
- Credit card system
- Electronic funds transfer
- Paperless bill
- Modern payment cash
- Electronic cash

8 Planning for Electronic Commerce [4 Lectures]

- Planning electronic commerce initiaties
- Linking objectives to business strategies
- Measuring cost objectives
- Comparing benefits to costs
- Strategies for developing electronic commerce web sites

9 Internet Marketing [4 Lectures]

- The PROS and CONS of online shopping
- The cons of online shopping
- Justify an Internet business
- Internet marketing techniques
- The E-cycle of Internet marketing
- Presonalisation e – Commerce

10 E- Governance for India [2 Lectures]

- E- Governance of India
- Indian customer EDI system
- Service centre
- Imports
- Exports

Reference books

1. e-Commerce Concepts , Models , Strategies by G.S.V Murthy
2. E-Commerce by Kamlesh K Bajaj and Debjani Nag
3. Electronic Commerce by Gary P. Schneider

MCA SEM II
Subject CS-206 Elective II
Accounting and Financial Management

1. Accounting:
   Basic concepts ,Convention and principles, Double entry system, Introduction to basic of accounts, Journal, Ledger, Closing of book of accounts, Trial balance.

2. Final account:
   Trading, Profit & Loss accounts and Balance sheet.

3. Introduction to Financial Management :
   Meaning and Scope.

4. Ration analysis:
   Meaning, Advantages , Limitation, Types.

5. Fund flow statement:
   Meaning, Importance, Preparation and Interpretation

6. Cash flow statement:
   Meaning, Importance, Preparation and Interpretation

7. Introduction to costing:
   Meaning, Important principles and type, marginal costing and shared Costing.

8. Budget and budgetary control:
   Meaning, Important types (master budget and flexible budget) and preparation.

9. Introduction to computerized accounting system:
   Coding logic and codes required.
   Master file ,transaction files,
   Introduction to documents used to data collection.

Processing of different files and outputs obtained.
Introduction to important accounting package e.g. Tally

Reference Books :

1. Shukal & Greval - Advance accounts S.Chand & co.
2. Sharma & Gupta - financial management Kalyani pub.
3. Sharma & Gupta - Management Accounting, Kalyani pub.