

**OUTLINE SYLLABUS OF  
POST GRADUATE DIPLOMA IN COMPUTER APPLICATION (PGDCA)**

**Semester – 1**

**Time(hr)**

101	Computer Graphics & Multimedia	35
102	Business Systems	35
103	Computer Organization and System Software	35
104	Programming in C	35
105	System Analysis and Design	35
106	Practical	150

**Semester – 2**

**Time(hr)**

107	Data Communication and Networks	35
108	Programming in VB	35
109	RDBMS concepts using SQL Server	35
110	Object Oriented Programming Using C++	35
111	Internet Programming Tools	35
112	Practical	150

**PROJECT – 60 hrs**

**Total hours – 650 hrs**

**Semester –1**

**Computer Graphics & Multimedia**

**Time : 35 hrs**

**Outline of Syllabus:**

**Minimum number of hours**

1.	Applications	02
2.	Graphic Devices	02
3.	Graphics Operations	03
4.	Concept of Graphics	03
5.	3D Graphics	03
6.	Multimedia	03
7.	Web Graphics	08
8.	Animation	04
9.	Multimedia Tools	07

1. Applications
  - 1.1 Presentation graphics, education and training, entertainment
  - 1.2 CAD for : architecture, mechanical engineering, aeronautical and automobile Industry
  - 1.3 Other areas : simulation, animation, video games
2. Graphic Devices
 

Display systems

  - 2.1.1 Raster scan displays : refresh CRT, gray shades, look up tables, interlacing
  - 2.1.2 Colour monitors : RGB, shadow masks, look up tables
  - 2.1.3 Flat panel displays : plasma panels, liquid crystal displays
  - 2.1.4 VGA, SVGA resolutions

- 2.2 Input devices
  - 2.2.1 Digitizing tablets : electromagnetic, electrical, acoustic types
  - 2.2.2 Mouse : mechanical and optical track ball, data gloves, light pen
  - 2.2.3 Touch panels : optical, capacitive, conic types.
  - 2.2.4 Image Scanners : types, typical resolutions, sizes, output formats available
- 3. Graphic Operations
  - 3.1. Clipping
    - 3.1.1 Windowport and viewport
    - 3.1.2 Elimination of totally visible and totally invisible lines with respect to a rectangular window using line end point codes
    - 3.1.3 Explicit line clipping algorithm
    - 3.1.4 Sutherland Cohen algorithm
  - 3.2 Filling
    - 3.2.1 Stack based and queue based seed fill algorithms
    - 3.2.2 Scan line seed fill algorithm
    - 3.2.3 Generation of bar charts, pie charts
    - 3.2.4 Character generation
- 2 Concept of Graphics
  - 3.1 Introduction to Multimedia System Architecture
  - 3.2 Graphics Kernel System
- 5. 3D Graphics
  - 5.1 Transformations
    - 5.1.1 Right handed coordinate system with vertical y-axis
    - 5.1.2 Transformation matrices for translation, scailing, rotation around axes
  - 5.2 Parallel projection
    - 5.2.1 Multiviews- front, top and side views
    - 5.2.2 Oblique view- projection on xy plane with rays along a given direction
  - 5.3 Perspective projection
    - 5.3.1 Transformation matrix to yield on vanishing point perspective view with viewpoint lying on z axis
    - 5.3.2 Effect of translating the object
    - 5.3.3 Computing the vanishing print
    - 5.3.4 Numerical examples
  - 5.4 Hidden surface removal
    - 5.4.1 Back face removal
    - 5.4.2 Floating horizon technique
- 6. Multimedia
  - 3.1 Concepts of hypertext/hypermedia
  - 3.2 Multimedia application
    - 3.2.1 Education,
    - 3.2.2 video conferencing,
    - 3.2.3 training,
    - 3.2.4 entertainment,
    - 3.2.5 electronic encyclopedias
  - 6.3 Multimedia hardware
    - 6.1.1 CD ROM,
    - 6.1.2 Audio speaker,
    - 6.1.3 Sound Card,
    - 6.1.4 Video Cameras,
    - 6.1.5 Scanners,
    - 6.1.6 MIDI
  - 6.2 Images,
    - 6.2.1 bit maps,
    - 6.2.2 windows paint brush

- 6.3 Languages of sound,
  - 6.3.1 digital sound,
  - 6.3.2 playing MIDI files,
  - 6.3.3 generating sound
- 6.4 Currently available multimedia software
- 7 Web Graphics
  - 7.1 Text Editing
    - 7.1.1 Basics of Word Processing
      - 7.1.1.1 Creating
      - 7.1.1.2 Saving
      - 7.1.1.3 Printing Documents
    - 7.1.2 Use of menu and toolbars
    - 7.1.3 Formatting of
      - 7.1.3.1 Character
      - 7.1.3.2 Paragraph
      - 7.1.3.3 Page
    - 7.1.4 Importing and Exporting of Documents
  - 7.2 Image Editing
    - 7.2.1 Introduction to Scanner(Concepts of DPI)
      - 7.2.1.1 File Formats
        - 7.2.1.1.1 Bmp
        - 7.2.1.1.2 Jpg
        - 7.2.1.1.3 Tif
        - 7.2.1.1.4 pcx
      - 7.2.1.2 Acquiring Image
      - 7.2.1.3 Importing image
      - 7.2.1.4 Exporting Image
      - 7.2.1.5 Menu and Toolbars
      - 7.2.1.6 Reduction and Enlargement of Image
    - 7.2.2 Raster Graphics
    - 7.2.3 Vector Graphics
    - 7.2.4 Image Enhancement
    - 7.2.5 Image Manipulation
  - 7.3 Audio Editing
    - 7.3.1 Hardware Requirements
      - 7.3.1.1 Sound Blaster Card
      - 7.3.1.2 Speakers
      - 7.3.1.3 Microphones
    - 7.3.2 Types of CD's and CD Drives
    - 7.3.3 File Format (wav, midi, tracks etc.)
    - 7.3.4 Recording of Audio (Mono/Stereo) through Microphone
    - 7.3.5 Recording of Audio (Mono/Stereo) through CD's
    - 7.3.6 Audio Mixing and Editing
    - 7.3.7 Audio Compression and Decompression
  - 7.4 Video Editing
    - 7.4.1 Hardware Requirements
      - 7.4.1.1 Video Blaster Card
      - 7.4.1.2 Video Camera
    - 7.4.2 Capturing/ Digitizing of still/Motion Pictures
    - 7.4.3 File Formats
    - 7.4.4 File standards
    - 7.4.5 AVI to MPEG Pictures
    - 7.4.6 Video Compression and Decompression
- 8 Animation

- 8.1 Tweeking
  - 8.2 Morphing
  - 8.3 2D Editor and Animation
  - 8.4 2D to 3D Conversion
  - 8.5 3D Editing and Rendering
  - 8.6 Material Editor and Rendering
  - 8.7 Light
  - 8.8 Camera Concept
  - 8.9 Key Framer
  - 8.10 Menu and Tool Bar
  - 8.11 File Formats
    - 8.11.1 SHP
    - 8.11.2 3DS
    - 8.11.3 FLI
    - 8.11.4 FLC
- 9 Multimedia Tools
- 9.1 Adobe Photoshop
    - 9.1.1 Toolbox
    - 9.1.2 Creating new Images
    - 9.1.3 Opening and Importing images
    - 9.1.4 Color Modes
      - 9.1.4.1 HSB Model
      - 9.1.4.2 RGB Model
      - 9.1.4.3 CMYK Model
    - 9.1.5 Lasso
      - 9.1.5.1 Polygon Lasso
      - 9.1.5.2 Magnetic Lasso
    - 9.1.6 Channels and Masks
    - 9.1.7 Layers
    - 9.1.8 Filters
    - 9.1.9 Creating Special Effects
    - 9.1.10 Creating Backgrounds
    - 9.1.11 Saving Images
    - 9.1.12 Importing Images
    - 9.1.13 File Compression
    - 9.1.14 File Formats
  - 9.2 Introduction to Flash
  - 9.3 Introduction to GIF Animator

#### BOOKS RECOMMENDED FOR READING AND REFERENCE

##### MAIN READING

1. D.F. Rogers, Procedural elements for Computer Graphics, McGraw Hill International Ed., 1986
2. Rogers & Adams, Mathematical Elements for Computer Graphics, McGraw Hill International Ed. 1990
3. D Hearn & P M Baker, Computer Graphics, Prentice Hall of India (2<sup>nd</sup> Edition), 1996
4. Ian Sinclair, Multimedia on the PC, BPB Publication
5. Adobe Premier UserManual
6. Using Adobe Photoshop 5.0, Dan Giordan and Steve Moniz
7. Adobe Photoshop 6.0, Cary David Bouton, Barbara Bouton, Gary Kubicek, Mara Zebest Nathanson
8. Multimedia Sound & Video By Lozano,Jose
9. CFS Study Material
10. Flash 4 Web special Effects, Animation & Design Milburn,Ken, Croteau,John

11. Macromedia Flash by Macromedia
12. OpenGL programming guide by Woo, Neider, Davis & Shreiner, 3<sup>rd</sup> Edition 2000, Pearson Education Asia.

**SUPPLEMENTARY READING**

1. J.D. Foley & A Van Dam, Fundamentals of Interactive Computer Graphics, Addison Wesley (2<sup>nd</sup> Edition)
2. S. Harrington, Computer Graphics – A Programming, McGraw Hill Approach International Ed.
3. Prabhat K. Andleigh, Multimedia System Design Prentice Hall Kiran Thankrar, 1996
4. Simon Collin, Multimedia made simple, Asian Books Pvt. Ltd.
5. Flash 4 Bible, Lents. Jane Warner Roberts
6. Flash 4 Magic, Emberton, David J. Hamlin J, Scott  
Business Systems

Time : 35 hrs

**Outline of Syllabus:**

		Minimum number of hours
1	Introduction to Business Data Processing	4
2	Business Files	2
3	Principles and Techniques of Programming	6
4	Visual FoxPro	12
6	Business Applications	2
6	Implementations of Business applications	3
7	Overview of Business Functions	2
8	Evolution of Information Systems(ERP)	2
9	Introduction of E-Commerce	2

1. Introduction to Business data processing
  - 1.1 Overview of business systems
    - 1.1.1 Management functions
    - 1.1.1 Levels of management
    - 1.1.2 Information requirements for planning , coordination and control for various levels in business industry and Government.
  - 1.2 Profile of data in Business systems
    - 1.2.1 Large volumes of data and data handling implicit.
    - 1.2.2 Identification of relevant data
    - 1.2.3 Classification of data elements by function(Master,Transaction,Control,Security,Checking)and by source(Raw and Derived)
    - 1.2.4 Primary and Secondary
    - 1.2.5 Historical data for reference and analysis
    - 1.2.6 Need for ensuring accurate, reliable and timely processing of data
    - 1.2.7 Basic tasks in business data processing, data origination, capture sorting merging, calculating, summarizing, managing output-results, storing and retrieving transmission, both interim and final
    - 1.2.8 Examples of business data processing and applications, Payroll, Financial, Accounting, Inventory, etc.
  - 1.3 Computer System as a potent tool to meet business data processing needs, facilities available in computerized systems for:
    - 1.3.1 Data capture, online and offline
    - 1.3.2 Validation, storage, processing and output
    - 1.3.3 Transmission
  - 1.4 Case Study-Financial Accounting

2. **Business Files**
  - 2.1 **Data Structure**
    - 2.1.1 Elements, fields, records
    - 2.1.2 Fixed and variable lengths
    - 2.1.3 Record layout
    - 2.1.4 Data codes-alphabetic, alphanumeric, numeric
  - 2.2 **Files**
    - 2.2.1 Contents of master file-Information of permanent and semi-permanent nature
    - 2.2.2 Transaction file and Transaction file organization
    - 2.2.3 Sequential, relative and indexed
    - 2.2.4 File creation and handling
    - 2.2.5 File identification – Header label (label record), generation number
    - 2.2.6 File security and data security-retention date, write permission, access control e.g. passwords
    - 2.2.7 Addition and deletion of records-updation
    - 2.2.8 Modes of processing; Batch, online and real-time
  - 2.3 **Backup for data security**
    - 2.3.1 File corruption potential and data loss
    - 2.3.2 Three generations of back-up(grand father/father/son)
    - 2.3.3 Concepts for file recovery
  - 2.4 **Case study-Financial Accounting**
3. **Principles and Techniques of Programming**
  - 3.1 Introduction to programming
  - 3.2 Program definition
  - 3.3 Program life cycle
  - 3.4 Characteristics of a good program
  - 3.5 Data handling
  - 3.6 Introduction to flowcharts
  - 3.7 Operation on file :
    - 3.7.1 Input
    - 3.7.2 Output
    - 3.7.3 I/O
  - 3.8 **Concepts of DBMS**
    - 3.8.1 Databases defined
    - 3.8.2 Relational databases defined
    - 3.8.3 Phases of database design :
      - 3.8.3.1 Data definition
      - 3.8.3.2 Data refinement
      - 3.8.3.3 Establishing relationship between fields
  - 3.9 Keywords used for file processing
  - 3.10 Report production and file updation
  - 3.11 Learning to make simple reports production
  - 3.12 Overview of control break procedure for report production
  - 3.13 Multiple handling
  - 3.14 File Updation :
    - 3.14.1 Sequential file-updation
    - 3.14.2 Random updation
  - 3.15 **Pseudocodes**
    - 3.15.1 Pseudocode defined
    - 3.15.2 Examples of pseudocode with dry run
  - 3.16 Modular programming
  - 3.17 Structured approach to programming
  - 3.18 Checking programming design
  - 3.19 Program development process

- 3.20 Software utilities
- 3.21 Source code creation
- 3.22 Translators and Assemblers
- 3.23 Linkers
- 3.24 Program documentation
- 4 Visual FoxPro
  - 4.1 Intorduction to Visual Foxpro
    - 4.1.1 Introduction
    - 4.1.2 Fundamentals of Database Concept
    - 4.1.3 What is a Relational Dabase?
    - 4.1.4 Introducing Visual Foxpro 6.0
    - 4.1.5 Starting Visual Foxpro
    - 4.1.6 File Types
    - 4.1.7 The Toolbar
    - 4.1.8 Visual Design and Wizards
    - 4.1.9 Command Window and View Window
    - 4.1.10 Other Features of the Visual Foxpro
  - 4.2 Tables in Visual FoxPro
    - 4.2.1 Table in Visual Foxpro
    - 4.2.2 Creating a New Table
    - 4.2.3 Creating Table using Table Designer
    - 4.2.4 Modifying a Table
    - 4.2.5 Opening a Table
    - 4.2.6 Appending Data
    - 4.2.7 Editing Data
    - 4.2.8 Moving through a Table
    - 4.2.9 Go to Record Command
    - 4.2.10 Find and Replace
    - 4.2.11 Deleting a Record
    - 4.2.12 Viewing the Table in Edit and Browse Modes
    - 4.2.13 The Table Wizard
    - 4.2.14 Quit Visual Foxpro
  - 4.3 Using Queries
    - 4.3.1 Introduction
    - 4.3.2 Creating a Query
    - 4.3.3 Query Wizard
    - 4.3.4 Query Wizard
    - 4.3.5 The Cross Tab Wizard
  - 4.4 Using Forms
    - 4.4.1 Introduction
    - 4.4.2 Autoforms
    - 4.4.3 Using the Form's Control Panel
    - 4.4.4 Running the Form
    - 4.4.5 Navigating the Form
    - 4.4.6 Editing a Form's design
    - 4.4.7 Deleting and Modifying Form Objects
  - 4.5 Designing and Printing Reports
    - 4.5.1 Introduction
    - 4.5.2 Autoreports
    - 4.5.3 Creating a Report using Report Designer
    - 4.5.4 Creating and Modifying a Report
    - 4.5.5 Enhancing the Report Designer Window
    - 4.5.6 Enlarging Bands and Moving Text Objects

- 4.5.7 The Report Controls Toolbar
- 4.5.8 Saving the Report
- 4.5.9 Printing a Report
- 4.5.10 Creating Report using Report Wizards
- 4.5.11 Creating a Group/Total Report
  
- 4.6 Mailing Labels and Mail Merge
  - 4.6.1 Introduction
  - 4.6.2 Creating address Table Structure
  - 4.6.3 Using Label Wizard
  - 4.6.4 Printing Mailing Label
  - 4.6.5 Generating Labels from a Range of Records
  - 4.6.6 Using Mail Merge
  - 4.6.7 Mail Merge
- 4.7 Working from the Command Window
  - 4.7.1 Using the Command Window
  - 4.7.2 Creating a New Table
  - 4.7.3 Modifying the Structure of a Table
  - 4.7.4 Displaying and Editing Data
  - 4.7.5 Delete and Recall Commands
  - 4.7.6 Using Different Command
  - 4.7.7 What is Expression ?
  - 4.7.8 Logical Functions
  - 4.7.9 Logical Functions
  - 4.7.10 Sorting and Indexing
  - 4.7.11 Sort
  - 4.7.12 Sorting a Table
  - 4.7.13 Sorting Table on Multiple Fields
  - 4.7.14 Index
  - 4.7.15 Indexing Commands
  - 4.7.16 Query with Find Command
  - 4.7.17 Query with Seek Command
  - 4.7.18 Rushmore Technology
  - 4.7.19 Setting a Filter Condition
  - 4.7.20 Use of Matro(s)
  - 4.7.21 Memo Field Handling
  - 4.7.22 Date and Time Functions
- 4.8 Working with Relational Database in Visual FoxPro
  - 4.8.1 Concept of Relational Databases
  - 4.8.2 Entering and Viewing Data using the Form Wizard
  - 4.8.3 Query Wizard to work with Relational Databases
  - 4.8.4 Using One-To-Many Report Wizard
  - 4.8.5 Using the View Window
  - 4.8.6 Using Queries and SQL
  - 4.8.7 Queries Vs Views
  - 4.8.8 Query Designer
  - 4.8.9 SQL Select Command
  - 4.8.10 Other SQL Commands
  - 4.8.11 Using Visual Foxpro Database
- 4.9 Visual FoxPro Utilities
  - 4.9.1 Importing and Exporting Data using Import Wizard
  - 4.9.2 Editing Text
  - 4.9.3 Edit Menu
  - 4.9.4 Format Menu



- 4.9.5 Spelling Tool
- 4.9.6 Object Linking and Embedding
- 4.9.7 Creating a Query
- 4.10 Programming and Developing Applications using Visual FoxPro
  - 4.10.1 An Overview of Programming
  - 4.10.2 Input/Output
  - 4.10.3 Picture Clauses
  - 4.10.4 Control Flow
  - 4.10.5 Exit and Loop Command
  - 4.10.6 Procedure and Parameters
  - 4.10.7 Using the Menu Designer
  - 4.10.8 Using the Project Manager
  - 4.10.9 Techniques of Writing Efficient Visual FoxPro Programming Code
  - 4.10.10 Creating a Query
  - 4.10.11 Query Wizard
  - 4.10.12 Query Wizard
  - 4.10.13 The Cross Tab Wizard
- 5 Business Application
  - 5.1 Design, analysis and development of –
    - 5.1.1 Computerized Financial Accounting
    - 5.1.2 Computerized inventory control
    - 5.1.3 Computerized payroll
  - Computerized invoicing application
- 6. Implementation of Business Application Controls
  - 6.1.1 Input-Output Control
  - 6.1.2 File Access control
  - 6.1.3 Process control
  - 6.1.4 Passwords and other security aspects
  - 6.1.5 Job Scheduling
  - 6.1.6 Computer log
  - 6.2 Documentation
    - 6.2.1 Need and philosophy
    - 6.2.2 Updation of documentation
    - 6.2.3 Requests for change
    - 6.2.4 Monitoring and control
  - 6.3 Management of computer resources
    - 6.3.1 Centralized traditional data processing department
    - 6.3.2 Emerging scene of distributed processing
      - 6.3.2.1 User involvement in identifying and organizing for its information needs
      - 6.3.2.2 Centralized management in respect of hardware, software, personnel, data bases, security and policy
  - 6.4 System Audit
    - 6.4.1 Need and objective-protecting against risks of loss, corruption, fraud and sabotage in respect of hardware, software and data
    - 6.4.2 Audit approaches and methods-systems, financial, hardware, software, place in SDLC, testing methodologies.
- 7 Overview of business functions
  - 7.1 Business functions in an organization
    - 7.1.1 Material management
    - 7.1.2 Scheduling
    - 7.1.3 Shop floor control
    - 7.1.4 Forecasting
    - 7.1.5 Accounting and finance
    - 7.1.6 Human Resources

- 7.1.7 Productivity managements
- 7.2 Typical business processes
  - 7.2.1 Core processes
    - 7.2.1.1 Product control
    - 7.2.1.2 Sales order processing
    - 7.2.1.3 Purchases
  - 7.2.2 Administrative process
    - 7.2.2.1 Human resource
    - 7.2.2.2 Finance
  - 7.2.3 Support processes
    - 7.2.3.1 Marketing
    - 7.2.3.2 Strategic planning
    - 7.2.3.3 Research and development
- 7.3 Problem in traditional functional law
  - 7.3.1 Need for integrated process view
  - 7.3.2 'Information' as a resource
  - 7.3.3 Motivation for ERP
- 8 Evolution of information systems
  - 8.1 Electronics Data Processing (EDP)
  - 8.2 Management Information System (MIS)
  - 8.3 Executive Information Systems (EIS)
  - 8.4 Information needs of organization
    - 8.4.1 Strategic level
    - 8.4.2 Tactical level
    - 8.4.3 Operational level
  - 8.5 'ERP' as an integrator of information needs at various levels
  - 8.6 Decision making involved at the above level
- 9 E-Commerce
  - 9.1 Definition of e-commerce
  - 9.2 Potential Benefits
  - 9.3 Business & e-commerce
  - 9.4 Business Organization and e-commerce
  - 9.5 Study and Analysis of following Business Modules with Web applications
    - 9.5.1 Manufacturing
    - 9.5.2 Service Organization
    - 9.5.3 Trade Business (Whole Sale, Retail)

#### BOOKS RECOMMENDED FOR READING AND REFERENCE

##### Main reading

1. V.K Kapoor, Introduction to Computer Data Processing & System Analysis, Sultan Chand
2. M.M Lipschutz, Theory and Problems of Data Processing, Schaum Series
3. R.K Taxali, Visual Foxpro 6.0 Made simple for DOS & Windows, BPB Publications, 1996
4. V.K. Garg and N.K. Venkitakrishana, Enterprise Resource Planning : Concepts and Practival Prentice Hall (I), 1999, N. Delhi
5. J. Kanter, Managing with Information, Prentice Hall (I), 1996, N. Delhi
6. S. Sadagopan, Management Information Systems, Prentice Hall (I), 1997, N. Delhi
7. V Rajaraman, Analysis and Design of Information Systems, Prentice Hall (I), 1997, N. Delhi
8. Beginning E-commerce with Visual Basic, ASP, SQL Server 7.0 & MTS by Matthew Reynolds (WROX Publication)

##### Supplementary Reading

1. Griver, FoxPro 2.6 Code Book, BPB Publication, 1994
  2. Siegel, Mastering FoxPro 2.6, BPB Publication, 1994
- Computer Organization and System Software

## Outline of Syllabus:

		Minimum number of hours
1.	Introduction and Background	03
2.	Architecture of a Simple Processor	03
3.	CPU organization	04
4.	Assembly Language Programming	03
5.	Arithmetic Algorithm	04
6.	I/O organization	04
7.	Memory organization	07
8.	Introduction to system programming	07

1. Introduction and Background
  - 1.1 Evolution of computers
  - 1.2 Stored program concept and Von Neumann Architecture
  - 1.3 Information representation and codes
  - 1.4 Building blocks of computers
    - 1.4.1 Combinational blocks: gates, multiplexes, decoders, encoders, etc.
    - 1.4.2 Sequential Building Blocks : flip flops, registers, counters, random access memory etc.
2. Architecture of a Simple Processor
  - 2.1 A Simple computer organization and instruction set
  - 2.2 Types of Processors
  - 2.3 Instruction execution in terms of microinstructions
  - 2.4 Concepts of interrupt and simple I/O organization
  - 2.5 Implementation of the processor using building blocks
3. CPU organization
  - 3.1 Addressing modes
  - 3.2 Instruction formats
  - 3.3 CPU organization with large register
  - 3.4 Stacks and handling of interrupts and subroutines
  - 3.5 Instruction pipelining : stages, hazards and methods to remove hazards
4. Assembly Language Programming
  - 4.1 Machine and assembly language
  - 4.2 Pseudo-operations
  - 4.3 Subroutines in assembly language
  - 4.4 Interrupt and I/O programming
  - 4.5 Examples
5. Arithmetic Algorithm
  - 5.1 Number systems
  - 5.2 Addition and subtraction for sign magnitude and 2's complement numbers
  - 5.3 Integer multiplication using shift and add
  - 5.4 Booth's algorithm
  - 5.5 Integer division
  - 5.6 Floating point representations and arithmetic algorithms
6. I/O organization
  - 9.4 Strobe based and handshake based communication
  - 9.5 Vector and priority interrupts
  - 9.6 DMA based data transfer
3. Memory organization
 

Classification of Memory

Basic cell of static & dynamic RAM

- Building large memories using chips
- Associative memory
- Cache memory organization
- Virtual memory organization
- 4. Introduction to system programming
  - Assemblers and macro assemblers
  - Introduction to loaders and linkers
  - Introduction to compilers
  - Introduction to operating systems

### BOOKS RECOMMENDED FOR READING AND REFERENCE

#### MAIN READING

2. M. Morris Mano, Computer System Architecture, Prentice Hall, International 3<sup>rd</sup> Edition, 1993
3. D.M. Dhamdhare, Introduction to System Software, Tat McGraw Hill, NewDelhi, 1986

#### SUPPLEMENTARY READING

1. P. Pal Choudhuri, Computer Organisation and Design, Prentice Hall of India Ltd., 1994
2. J.P. Hayes, computer Architecture and Organisation, McGraw Hill, New York, 1988
3. D.A. Patterson & J.L. Hennessy, Morgan Kanufmann, Computer Architecture : A Quantitative Approach, 2<sup>nd</sup> Edition, 1996

### Programming in C

Time : 35 hrs

#### Outline of Syllabus:

		Minimum number of hours
1	Overview of Programming	03
2	Fundamentals of C Programming	10
3	Dynamic Data Structure in C	06
4	Miscellaneous features	06
5	Implementation of Data Structures (Arrays, Stacks, Queues and linked Lists) in Practical	10

1. Overview of Programming
  - 1.1 Introduction to computer-based problem solving, requirement of problem solving by the computer
    - 1.1.1 Problem definition
    - 1.1.2 Use of examples for problem solving
    - 1.1.3 Similarities between problem
    - 1.1.4 Problem solving strategies
  - 1.2 Program design and implementation issues
    - 1.2.1 Programs and algorithms
    - 1.2.2 Top-down design and stepwise refinement
      - breaking a problem into sub-tasks
      - data organization or data structures
    - 1.2.3 Construction of loops-basic programming construct
      - establishing initial conditions
      - terminating conditions
    - 1.2.4 Implementation
      - use of procedures for modular design
      - choice of variable names
      - documentation of programs

- program testing
- 1.3 Programming Environment
  - 1.3.1 Programming language classification, machine language, assembly language, high level languages
  - 1.3.2 Assemblers
  - 1.3.3 Compilers
  - 1.3.4 Interpreters
- 1.4 Programming Methodologies
  - 1.4.1 Procedural Approach
  - 1.4.2 Structural Approach
- 2 Fundamentals of C Programming
  - 2.1 Overview of C
    - 2.1.1 History of C
    - 2.1.2 Structure of a C program
  - 2.2 Data types
    - 2.2.1 Data types --- int, float, char, double, void
    - 2.2.2 Data structures
  - 2.3 Constants and Variables
    - 2.3.1 Variable declaration
      - integer, real, float, character, logical variables
      - string variables
    - 2.3.2 Constants
  - 2.4 Operators and Expressions
    - 2.4.1 Arithmetic operators
    - 2.4.2 Relational operators
    - 2.4.3 Logical operators
    - 2.4.4 Expressions
  - 2.6 Control Constructs
    - 2.6.1 if-then
    - 2.6.2 for
    - 2.6.3 while
  - 2.6 Arrays
    - 2.6.1 Array declaration
    - 2.6.2 One and two dimensional arrays
  - 2.7 Functions-Fundamentals
    - 2.7.1 General Form
    - 2.7.2 Function arguments
    - 2.7.3 Return value
  - 2.8 Basic I/O
    - 2.8.1 Formatted Input/Output
    - 2.8.2 Unformatted Input/Output
  - 2.9 Program Design Examples
    - 2.9.1 Summation of a set of numbers
    - 2.9.2 Generation of fibonacci sequence
    - 2.9.3 Generation of positive prime numbers
    - 2.9.4 Finding k<sup>th</sup> smallest element
    - 2.9.6 Sorting by insertion
  - 2.10 Advanced features
    - 2.10.1 Type modifiers and storage class specifiers for data types
    - 2.10.2 Bit operators. ?operator, & operator, \* operator
    - 2.10.3 Type casting, type conversion
- 3. Dynamic Data Structures in C
  - 3.1 Pointers
    - 3.1.1 The & and \* operator
    - 3.1.2 Pointer expression
    - 3.1.3 Pointer assignments
    - 3.1.4 Pointer arithmetic
    - 3.1.5 Pointer comparison

- 3.1.6 The dynamic allocation functions-malloc and calloc
- 3.1.7 Pointer Vs Arrays
- 3.1.8 Arrays of pointers
- 3.1.9 Pointers to pointers
- 3.1.10 Initializing pointers
- 3.1.11 Pointer to functions
- 3.1.12 Function returning pointers
- 3.1.13 Functions with variable number of arguments
- 3.2 Structures
  - 3.2.1 Basic of structures
  - 3.2.2 Declaring a structure
  - 3.2.3 Referencing structure elements
  - 3.2.4 Array of structures
  - 3.2.5 Passing structures to functions
  - 3.2.6 Passing entire structure to functions
  - 3.2.7 Structure pointers
  - 3.2.8 Declaring a structure pointer
  - 3.2.9 Using structure pointers
  - 3.2.10 Arrays and structures within structures
  - 3.2.11 Uses
- 3.3 Unions
  - 3.3.1 Declaration
  - 3.3.2 Uses
  - 3.3.3 Enumerated data-types
  - 3.3.4 Typedef
- 3.4 Example Algorithms
  - 3.4.1 Linked list insertion, deletion and search
- 4 Miscellaneous features
  - 4.1 File Handling
    - 4.1.1 The file pointer
    - 4.1.2 File accessing function
    - 4.1.3 Stream Classes
    - 4.1.4 Writing & Reading of Strings
    - 4.1.5 Writing & Reading an Object in & from the File
  - 4.2 C/C++ Preprocessor
    - 4.2.1 #define
    - 4.2.2 #include
    - 4.2.3 #undef
    - 4.2.4 #undef
    - 4.2.5 #conditional compilation directives : #if, #else, #elif, #endif, #ifdef and #ifndef
  - 4.3 C/C++ Standard library and header files
    - 4.3.1 Header files
    - 4.3.2 Standard library functions
    - 4.3.3 String functions
    - 4.3.4 Mathematical function
    - 4.3.5 Date and time functions
    - 4.3.6 Variable argument list functions
    - 4.3.7 Utility functions
    - 4.3.8 Character class test functions
- 5 Implementation of Data Structures(Arrays, Stacks, Queues and linked Lists) in Practical

### BOOKS RECOMMENDED FOR READING AND REFERENCE

#### Main Reading

1. B.W. Kernighan & D.M.Ritchie, The C Programming Language, Prentice Hall of India, 1989.

2. Richard Johnson-baugh & Martin Kalin, Application programming in C, Macmillan International editions, 1990
- 3 Cooper, Mullish, The Spirit of C, Jaico Publishing House, New Delhi, 1987
- 4 R.G. Dromey, How to solve it by Computer, Prentice Hall of India, 1992

### Supplementary Reading

1. Jones, Robin & Stewart, The Art of C Programming, Narosa Publishing House, New Delhi
2. Kenneth A., C Problem solving and Programming, Prentice Hall International
3. Schildt.H, C Made easy, McGraw Hill Book Company, 1987.

## SYSTEM ANALYSIS AND DESIGN

Time : 35 hrs

### Outline of Syllabus:

		Minimum number of hours
1	Introduction	1
2	System Analyst	1
3	System Development Cycle	2
4	System Planning	3
5	System Design and Modeling	5
6	Input and Output	1
7	Modular and Structure Design	2
8	System Implementation and Maintenance	2
9	System Audit and Security	1
10	Introduction to MIS	2
11	MIS Planning	2
12	Conceptual Design of MIS	4
13	Detailed System Design and Implementation	4
14	MIS for Accounting and Finance Function	2
15	MIS for Personnel Systems	1
16	MIS for Marketing Systems	2

1. Introduction
  - 1.1 System definition and concepts
    - 1.1.1 Characteristics and types of system
    - 1.1.2 Manual and automated systems
  - 1.2 Real-life Business Sub-Systems-
    - 1.2.1 Production
    - 1.2.2 Marketing
    - 1.2.3 Personnel
    - 1.2.4 Material
    - 1.2.5 Finance
  - 1.3 System models; types of models
  - 1.4 Systems environments and boundaries
  - 1.5 Real-time and distributed systems
  - 1.6 Basic principles of successful systems
- 2 Systems Analyst
  - 2.1 Role and need of Systems Analyst
  - 2.2 Qualifications and responsibilities
  - 2.3 Systems Analyst as an agent of change

- 3 System Development Cycle**
  - 3.1 Introduction to systems development life cycle (SDLC)**
  - 3.2 Various phases**
    - 3.2.1 Study**
    - 3.2.2 Analysis**
    - 3.2.3 Design**
    - 3.2.4 Development**
    - 3.2.5 Implementation**
    - 3.2.6 Maintenance**
  - 3.3 System documentation considerations –**
    - 3.3.1 Principles of systems documentation**
    - 3.3.2 Types of documentation and their importance**
    - 3.3.3 Enforcing documentation discipline in an organization**
- 4 System Planning**
  - 4.1 Data and fact gathering techniques –**
    - 4.1.1 Interviews**
    - 4.1.2 Group communication**
    - 4.1.3 Presentations**
    - 4.1.4 Site visits**
  - 4.2 Feasibility study and its importance**
  - 4.3 Types of feasibility reports**
  - 4.4 System selection plan and proposal**
  - 4.5 Prototyping**
  - 4.6 Cost-Benefit analysis –**
    - 4.6.1 Tools and techniques**
- 5 Systems Design and Modeling**
  - 5.1 Process modeling**
  - 5.2 Logical and physical design**
  - 5.3 Design representations**
  - 5.4 Systems flowcharts and structured charts**
  - 5.5 Common diagramming conventions and guidelines using DFD and ERD for Data Modeling and systems analysis**
- 6 Input and Output**
  - 6.1 Classification of forms**
  - 6.2 Input/Output forms design**
  - 6.3 User-interface design**
  - 6.4 Graphical interfaces**
- 7 Modular and Structured Design**
  - 7.1 Module specifications**
  - 7.2 Module coupling and cohesion**
    - Top-down and bottom-up design**
- 8 System Implementation and Maintenance**
  - 8.1 Planning considerations**
  - 8.2 Conversion methods, procedures and controls**
  - 8.3 System acceptance criteria**
  - 8.4 System evaluation and performance**
  - 8.5 Testing and validation**
  - 8.6 Systems Quality Control and assurance**
  - 8.7 Maintenance activities and issues**
- 9 System Audit and Security**
  - 9.1 Computer system as an expensive resource**
    - 9.1.1 Data and storage media**
  - 9.2 Procedure and norms for utilization of computer equipment**
  - 9.3 Audit of computer system usage**



- 9.4 Audit trails
- 9.5 Types of threats to computer system and control measures
  - 9.5.1 Threat and risk analysis
  - 9.5.2 Disaster recovery and contingency planning
- 10 Introduction to MIS
  - 10.1 Meaning and role of MIS
  - 10.2 Definition to MIS
  - 10.3 Systems approach to MIS
  - 10.4 MIS organization within a company
- 11 MIS Planning
  - 11.1 General business planning
  - 11.2 Derivation of MIS plans
  - 11.3 Prioritisation and developmental strategies
- 12 Conceptual Design of MIS
  - 12.1 Definition of the problem
  - 12.2 System objectives and system constraints
  - 12.3 Analysis of information source
  - 12.4 Alternative system design and selection of optimal system
  - 12.5 Conceptual system design documents.
- 13 Detailed System Design and Implementation
  - 13.1 Application of basic system design concepts of MIS
  - 13.2 Involvement of end-user and role of MIS department and System Analyst
  - 13.3 Role of Top Management during design and implementation
  - 13.4 System evaluation, review and update.
- 14. MIS for Accounting and Finance Function
- 15. MIS for Personnel Systems
- 16. MIS for Marketing Systems

### Books Recommended for Reading and Reference

#### Main Reading

1. Marvin Gore, John Stubbe, Element of System Analysis, Galgotia Book Source, 1994
2. Whitten, Bentley and Barlow, Systems Analysis and Design Methods, Galgotia Publication 1996
3. Elias M. Award, System Analysis & Design, Galgotia Publications, 1996
4. P.S.Grover, System Analysis & Design, BPB Publication, 1994.

#### Supplementary Reading

1. Harry Edwards, System Analysis & Design, McGraw-Hill International Ed., 1996
2. Mark G. Simkin, Introduction to Computer Information Systems for Business, S.Chand & Co.,, 1996
3. I.T. Hawryszkiewicz, Intoduction to System Analysis & Design, Prentice Hall of India, 1994.
4. James A. Senn, Analysis & Design of Information Systems, McGraw-Hill International Edition, 1989.
5. V.Rajaraman, Analysis & Design of Information Systems, Prentice Hall of India, 1991
6. James A. O'Brien, Management Information Systems, Galgotia Publications, 1994
7. Murdick, Ross & Claggett, Information System for Modern Management, Prentice Hall of India.

## Outline of Syllabus:

		Minimum number of hours
1	Introduction	02
2.	Concept of Networking	04
3.	Topologies	02
4.	Transmission Media	03
5.	Multichannel Data Communication	04
6.	Basic Software & Hardware components of Networking	05
7.	Data Networks	03
8.	Network Protocols	03
9.	Data Communication Systems	04
10.	Wireless Communication Basics	03
11	Internet Management Security Concepts	02

1. Introduction
  - 3.3 Communication System
  - 3.4 Analog data
  - 3.5 Digital data
  - 3.6 Communication channel
  - 3.7 Synchronous and asynchronous data
- 3 Concept of Networking
  - 3.1 What is Networking
  - 3.2 LAN
  - 3.3 WAN
  - 3.4 MAN
- 4 Topologies
4. Transmission Media
  - 4.1 Twin Wire
  - 4.2 Coaxial cable
  - 4.3 Radio, VHF and microwaves
  - 4.4 Satellite link
  - 4.5 Optical fibre
  - 4.6 Fibre – Optic Communication
    - 4.6.1 Optical source
    - 4.6.2 Propagation in fibre
    - 4.6.3 Light detector
    - 4.6.4 FDDI – fibre distributed data interface
- 5 Multichannel Data Communication
  - 5.1 Circuits, channels and concepts of Multichannelling
  - 5.2 PCM
  - 5.3 Frequency division multiplexing
  - 5.4 Time division multiplexing
  - 5.5 CODECS

- 6. **Basic S/W and H/W Components of Networking**
  - 6.1 **Network Interface Card**
  - 6.2 **Connector**
    - 6.2.1 **T-Connectors**
    - 6.2.2 **Jointers**
    - 6.2.3 **UDP Connectors**
    - 6.2.4 **Hub Units**
    - 6.2.5 **Repeaters**
    - 6.2.6 **Bridges**
    - 6.2.7 **Switches**
  - 6.3 **Network Protocols**
  - 6.4 **Operating Systems**
    - 6.4.1 **Server**
    - 6.4.2 **Client**
  - 6.5 **Routers**
    - 6.5.1 **MPR (Multi Protocol Routers)**
- 7. **Data Networks**
  - 7.1 **Circuit switching**
  - 7.2 **Packet switching**
  - 7.3 **PABX**
  - 7.4 **Network topologies**
- 8. **Network Protocols**
  - 8.1 **OSI model**
  - 8.2 **Data link protocols**
  - 8.3 **Local networks : Ethernet and token rings**
  - 8.4 **Satellite networks**
  - 8.5 **ISDN**
- 9 **Data Communication Systems**
  - 9.1 **Fascimile (FAX)**
  - 9.2 **Satellite communication**
  - 9.3 **Digital telephony**
- 10 **Wireless Communications**
  - 10.1 **Introduction to Wireless Communication**
    - 10.1.1 **The Wireless User Interface**
  - 10.2 **The World Wide Web without wires**
  - 10.3 **Hypertext Markup Language the wireless way**
  - 10.4 **Web Synchronization**
  - 10.5 **Server Side content**
  - 10.6 **Wireless Application Protocol**
    - 10.6.1 **The WAP standard**
    - 10.6.2 **WML Interface**
  - 10.7 **Dynamic Content with WML Script**
- 11 **Internet Management Security Concepts; Information Privacy and Copyright Issues**
  - 11.1 **Overview of Internet Security**
  - 11.2 **Firewalls**
  - 11.3 **Internet Management Security Concepts**
  - 11.4 **Information Privacy and Copyright Issues**
  - 11.5 **Common Types of Attacks**
  - 11.6 **Intrusion Detection and Incident Response**
  - 11.7 **Firewall Troubleshooting**
    - 11.7.1 **Symptoms**

## **BOOKS RECOMMENDED FOR READING AND REFERENCE**

### **MAIN READING**

1. Michael A. Miller, Introduction to Digital and Data Communications, JAICO Publishing
2. James Martin, Telecommunications and the Computer, Prentice-Hall
3. Computer Networks, Tanenbaum, Third Edition, Prentice-Hall, India
4. CFS Study Material
5. Internet Information Sever Guide by:-Mathew Strebe & Charles Perkins
6. Windows NT Security Hand Book by:Tom Sheldon(Tata McGRAW-HILL publication)

### **SUPPLEMENTARY READING**

1. U.D. Black, Data Communication and Distributed Networks, Prentice-Hall
2. James Martin Processing, Computer Networks and Distributed Processing, Prentice-Hall
3. The Wireless Application Protocol  
Pearson Education.

Outline of Syllabus:

		Minimum number of hours
1	Concept of Front-End and Back-End Tools	1
2	Introduction to Visual Basic	1
3	Programming in Visual Basic	3
4	Data types	2
5	Menus & Dialog Boxes	1
6	The File System Controls	1
7	Database Basics	2
8	Introduction to Bound Controls	2
9	Data Access controls/Objects	2
10	SQL	3
11	ODBC	2
12	Building Client-Server Databases	2
13	Data Report	2
14	Working with the Data Environment Designer (DED)	2
15	RTP Function Control	2
16	Linking a Report to your Application	2
17	Introduction to ActiveX Programming	5

1. Concept of Front-End and Back-End Tools
2. Introduction to Visual Basic
  - Working with VB
  - Starting Visual Basic
  - Drawing Shapes on a form
  - Properties & Project Window, Writing Code
4. Programming in Visual Basic
  - Terminologies used in VB
  - Data structure
  - Programming fundamentals
  - Modules & their procedures.
5. Data types
  - Variables and operators
  - Loops and Control statements
  - Arrays
  - Event programming
6. Menus & Dialog Boxes
  - Menus
  - Menu naming conventions
  - Dialog boxes
7. The File System Controls
  - Examining the file system
  - Drive list box
  - Directory list box
  - File list box
    - 6.4.1 Working with file attributes
8. Database Basics
  - Add a field
  - Using access as a programming tool
  - Accessing Database
  - Using a data control
  - Creating simple database applications
  - Recordsets

Programming with data control

  - Adding a specific record

- Deleting a specific record
- Finding a specific record
- 9. Introduction to Bound Controls
  - Data-bound list
  - Data-bound Combo
  - Data-bound Grid
  - Type of Controls
- 10. Data Access controls
  - DBList Control
  - DBCombo Control
  - DBGrid Control.
- 11. Data Access Objects
  - Relational Database Objects
  - Database structure
  - The Database Object
  - Creating Recordsets.
- 12. SQL
  - Writing Structured Query Language (SQL)
  - Multi-user Considerations
- 13. ODBC
  - Querying a database
  - ODBC concepts
  - ODBC and Visual Basic
- 14. Building Client-Server Databases
  - Remote data control
  - ActiveX Data Objects (ADO)
  - Uses of ADO control in Programming
  - Front-End Database Application
  - Executing Query in ADO
- 15. Data Reports
- 16. Working with the Data Environment Designer (DED)
- 17. RTPFunction Control
- 18. Linking a Report to your Application
- 19. Introduction to ActiveX Programming
  - Understanding the OLE DB/ADO Architecture
  - Record Locking in ADO
  - ADO Record-set Object to Manipulate data
    - Updating and Inserting records using the Record-set Object
  - Handling errors using the ADO Errors Collection

#### **BOOKS RECOMMENDED FOR READING AND REFERENCE**

##### **Main Reading**

1. Visual Basic 6 Secrets by Davis (IDG Books)
2. Visual Basic 4 Gurus (SAMS Publication) The Visual Basic 4 for Windows 96 Handbook by Cornell (TATA McGRAW HILL)

##### **Supplementary Reading**

1. Will Train, Visual Basic 6 – No Experience Required, BPB Publications, 1997
2. Nathan Gurewich and Ori Gurewich, Teach yourself Visual Basic 6.0, Techmedia, 1997

**RDBMS concepts using SQL Server**

**Time : 35 hrs**

**Outline of Syllabus:**

**Minimum number of hours**

1	Overview of Database Management	3
2	Database concepts and Design	3
3	Traditional Data Models	2
4	Relational Models	3
5	3-Tier architecture of Database	2
6	SQL/PLSQL	5
7	Embedded SQL and Application Programming Interfaces	3
8	Overview of Advanced DBMS	4
9	SQL-Server	10

1. Overview of Database Management
  - 1.1 Data, information and knowledge
  - 1.2 Increasing use of data as a corporate resource
  - 1.3 Data processing versus data management
  - 1.4 File-oriented approach versus database-oriented approach to data management (Disadvantages of file oriented approach)
  - 1.6 Data independence
  - 1.6 Database administration role
  - 1.7 DBMS architecture
  - 1.8 Different kinds of DBMS users
  - 1.9 Importance of data dictionary
  - 1.10 Contents of data dictionary
  - 1.11 Types of database language
  - 1.12 Data models
2. Database Concepts and Design
  - 2.1 ANSI/SPARC 3-level architecture
    - 2.1.1 Conceptual model
    - 2.1.2 Logical model
    - 2.1.3 Physical model
  - 2.2 Entity-Relationship model as a tool for conceptual design-entities attributes and relationships
  - 2.3 ER diagram
    - 2.3.1 Strong and weak entities
    - 2.3.2 Generalization; specialization and aggregation
  - 2.4 Converting an E-R model into relational schema
  - 2.5 Normalization concepts in logical (relational) model; update anomalies
    - 2.5.1 Functional dependencies
    - 2.5.2 Multi-valued dependencies
    - 2.5.3 Join dependencies
    - 2.5.4 Normal forms (1NF, 2NF, 3NF, BCNF, 4NF, 6NF, Domain-Key Normal Form)
  - 2.6 Issues in physical design
    - 2.6.1 Concepts of indexes
    - 2.6.2 File organization for relational tables
    - 2.6.3 Denormalization
    - 2.6.4 Clustering of tables
    - 2.6.5 Clustering indexes
3. Traditional Data Models
  - 3.1 ANSI/SPARC 3-level architecture and the place of logical data models in this architecture
  - 3.2 A brief overview of the three traditional models, namely, hierarchical model, network model and relational model.
  - 3.3 Data definition and data manipulation constructs in each of the three models with examples
  - 3.4 A comparison of the three models
4. Relational models

- 4.1 Definition of relation, properties of relational model (Codd's 12 rules or equivalent)
- 4.2 Concept of keys : candidate key, primary key, alternate key, foreign key
- 4.3 Fundamental integrity rules: entity integrity, referential integrity
- 4.4 Relational algebra : select, project, cross product, different types of joins (theta join, equi-join, natural join, outer join); set operations
- 4.5 Tuple relational calculus
- 4.6 Domain relational calculus
- 4.7 Simple and complex queries using relational algebra
- 4.8 Stand-alone and embedded query languages
- 5. 3-Tier Architecture of Database
- 6. SQL/PLSQL
  - 6.1 SQL constructs (SELECT ... FROM...WHERE....GROUP BY..... HAVING.....ORDER BY.....)
  - 6.2 INSERT; DELETE; UPDATE
  - 6.3 VIEW definition and use
  - 6.4 Temporary tables
  - 6.5 Nested queries
  - 6.6 Correlated nested queries
  - 6.7 SQL standard (SQL '86, SQL '89, SQL '92)
  - 6.8 Transaction processing and SQL
  - 6.9 Integrity constraints: Not null, unique, check primary key, foreign key, references
  - 6.10 Sub Queries
  - 6.11 Granting Permissions and Revoking Permissions
  - 6.12 Creating Reports in SQL Plus , Indexes
  - 6.13 PL\SQL-Introduction
    - 6.13.1 Datatypes
    - 6.13.2 Syntax
    - 6.13.3 Block Structures
    - 6.13.4 Conditional Control in PL\SQL
    - 6.13.5 Cursors
    - 6.13.6 Stored Procedures
    - 6.13.7 Stored Functions and Triggers
    - 6.13.8 Error Handling in PL\SQL
- 7. Embedded SQL and Application Programming Interfaces
  - 7.1 Limitation of SQL in handling complex applications
  - 7.2 Programmatic access to relational database
  - 7.3 Static embedded SQL
  - 7.4 Handling of nulls, cursors
  - 7.5 Use of SQLCA/SQLSTATE and dynamic embedded SQL
  - 7.6 SQLDA
  - 7.7 Application programming interfaces (API's)
  - 7.8 Types of API calls
  - 7.9 Native API's
  - 7.10 Introduction to ODBC (Open Database Connectivity)
- 8. Overview of Advanced DBMS
  - 8.1 Database internals
    - 8.1.1 Types of file organization used in contemporary database Management software (head, hashing, ISAM and B-Tree)
    - 8.1.2 Buffer management
  - 8.2 Query processing
    - 8.2.1 Query processing stages and what is done in each stage
    - 8.2.2 Use of query execution plans in improving application Performance
  - 8.3 Concepts of transaction and transaction processing
    - 8.3.1 ACID properties of transaction
    - 8.3.2 Examples of transaction
  - 8.4 Database concurrency and database recovery
    - 8.4.1 Ill effects of concurrency
    - 8.4.2 Transaction logs
    - 8.4.3 Concepts of two-phase locking



- 8.4.4 Deadlocks
- 8.5 Introduction to distributed databases
- 8.6 Introduction to client/server databases
- 9.6 Introduction to object-oriented databases
- 9.7 Database security
- 10 SQL –Server Programming**
  - 9.1 Control Flow Language
    - 9.1.1 Using IF-ELSE
    - 9.1.2 BEGIN-END
    - 9.1.3 CASE
    - 9.1.4 WHILE
  - 9.2 Stored Procedures
    - 9.2.1 Creating
    - 9.2.2 Executing
    - 9.2.3 Deleting
  - 9.3 Triggers
  - 9.4 Cursors
  - 9.5 BCP & DTS Concepts
  - 9.6 Transactions

### BOOKS RECOMMENDED FOR READING AND REFERENCE

#### MAIN READING

1. A.K. Majumdar, P. Bhattacharyya, Database Management Systems, Tata McGra-Hill, 1996
2. H. Korth, A.Silberschatz, Database System Concepts, McGraw-Hill (Second Edition), 1991
3. R. Elmasri, S. Navathe, Fundamentals of Database System, Benjamin Cummings (Second Edition), 1994
4. Bipin Desai, An Introduction to Database Systems, Galgotai Publication (West Publishing), 1991
- 6 F. Mc-Fadden, J. Hoffer, Modern Database Management, Benjamin cummings (Narosa), (Fourth Edition), 1994

#### Supplementary Reading

1. Peter Rob, Carlos Coronel, Database Systems : Design, Implementation and Management, Wadsworth Publishing Company , 1993
2. C.J. Date, An Introduction to Database Systems, Volume I, Addison Wesley (Fifth Edition), 1994
- 3 J.D, Ullman, Principles of Database Systems. Galgotia Publishing (Second Edition), 1994
- 4 D.M. Kroenke, Database Processing : Fundamentals, Design Implementation, Prentice Hall (Fifth Edition) 1994

### Object Oriented Programming Using C++

Time : 35 hrs

#### Outline of Syllabus:

		Minimum number of hours
1.	Principles of Object Oriented Programming	02
2.	Beginning with C++	02
3.	Tokens, Expressions and Control Structures	03
4	Functions in C++	03
5.	Class and Objects	03
6	Constructor and Destructors	03
7.	Operator Overloading and Type Conversion	05
8.	Inheritance Extending Class	03
9.	Member Classes	04
10.	Managing console I/O Operations	04
11.	Working with Files	03

1. Principles of Object Oriented Programming :

**Software Crisis; Software Evolution , A look at procedure-oriented Programming, Object Oriented Programming Paradigm, Basic Concepts of Object-Oriented Programming, benefits of OOP, Object Oriented Languages, Applications of OOP**

**2. Beginning with C++ :**

**What is C++?, Applications of C++, A simple C++ program, More C++ statements, An Example with Class, Structure of C++ program, Creating the source file, compiling and Linking.**

**3. Tokens, Expressions and Control Structures:**

**Introduction, Token, Keywords, Identifiers, Basic Data Types, User-defined Data types, Derived Data types, Symbolic Constants, type Compatibility, declarations of variables, Dynamic Initialization of variable, Reference Variables, Operators in C++ Scope Resolution Operator, Member Dereferencing Operators, memory management Operators, manipulators, Type case Operators, Expressions and Implicit Conversations Operator Overloading , Operator precedence, Control Structures.**

**4. Functions in C++**

**Introduction, The Main Function, Function Prototyping, Call by reference , Inline Functions, Default Arguments, const Arguments, Function Overloading, Friend and Virtual Functions.**

**5. Class and Objects:**

**Introduction: C structures Revisited, Specifying a class; defining Member Functions, a C++ Program with Class, making an outside function inline, nesting of member function, private member function, array within a class, Memory allocation for a object , Static Member Functions, Array of Objects, Object as Function arguments, Friendly Functions, returning Object, const member Functions, Pointers to Members.**

**6. Constructor and Destructors:**

**Introduction; Constructors, Parameterized Constructor, Multiple Constructor in a Class, Constructor with Default argument, Dynamic initialization of Objects, copy constructor, dynamic constructor, constructing two dimensional arrays, Destructors.**

**7. Operator Overloading and Type Conversion**

**Introduction, Defining operator overloading, overloading unary operators, overloading binary operators, overloading Binary operator using friends, manipulation of strings using operators, Rules for overloading operators, type conversions.**

**8. Inheritance Extending Class :**

**Introduction, defining derived class, single inheritance, making a private member inheritable, Multilevel inheritance, Multiple inheritance, Hierarchical Inheritance, Hybrid Inheritance, virtual base class, abstract classes, constructor in derived classes.**

**9. Member Classes**

**Nesting of Classes, Pointer**

**Virtual Function and Polymorphism**

**Introduction, Pointers to Objects, This Pointer, Pointers to derived classes, virtual Functions, pure virtual functions**

**10. Managing console I/O Operations :**

**Introduction, C++ Streams, C++ Stream Classes, Unformatted I/O operations, formatted console I/O Operations, Managing output with manipulators**

#### **11. Working with Files :**

**Introduction, Classes for File stream Operations, Opening and Closing files, Detecting end of file, More about Open(), File modes, File pointers and their Manipulations, Sequential Input and output operations, Updating file , random access, error handling during file operations, Command line argument.**

#### **BOOKS RECOMMENDED FOR READING AND REFERENCE**

##### **MAIN READING**

- 1. Object Oriented Programming in TURBO C++ , Galgotia, Robert Lafore**
- 2. Computer Science with C++, Sumita Arora, Dhanpat Rai & Co.**
- 3. Object Oriented Programming in C++, R. Balaguruswamy.**

Outline of Syllabus:

Minimum number of hours

1	Internet and World Wide Web	02
2	Web Browsers (Microsoft Internet Explorer, Netscape Navigator)	02
3	HTML	06
4	Macromedia Dreamweaver	04
5	DHTML	05
6	Client-side Scripting	08
7	Server-side Scripting	08

1. Internet and World Wide Web
  - 1.1 Introduction
  - 1.2 How does the Internet Functions?
  - 1.3 E-Mail
  - 1.4 World-Wide Web
  - 1.5 Accessing the internet
2. Web Browsers
  - 2.1 Browsing
  - 2.2 Microsoft Internet Explorer
  - 2.3 Netscape Navigator
3. HTML
  - 3.1 Introduction to HTML Programming
  - 3.2 Document Structure
  - 3.3 Text Formatting
  - 3.4 Web Content Organization
  - 3.5 Organizing Contents in Tables
  - 3.6 Insertion of Images
  - 3.7 Interactivity using Links
  - 3.8 Image Mapping
  - 3.9 Frames in HTML
  - 3.10 Style Sheets
4. Macromedia Dreamweaver
  - 4.1.1 HTML Assignments
5. DHTML
6. Client-side Scripting
  - Java Script
  - What is JavaScript
  - Running JavaScript
  - Placing Scripts in HTML Pages
  - Writing Comments
  - Difference Between VBScript And JavaScript
  - Variables & Literals
  - Expression and Operators
  - Statements
  - Functions
  - Pop-up Boxes
  - Miscellaneous functions
  - Objects
  - Properties
  - Methods
  - Events
  - Predefined objects

**Event Handlers**

**Creating JavaScript Hierarchy**

**Cookies**

**Introduction**

**Construction**

**Communication**

**Saving**

**Retrieving**

**Multiple cookies.**

- 7 Server-Side Scripting (Active Server Pages)**
  - 7.1 What is VBScript?**
  - 7.2 Variables and Control structures in VBScript**
  - 7.3 Typecasting variables**
  - 7.4 Formatting functions**
  - 7.5 Object model**
  - 7.6 Built in Functions**
    - 7.6.1 Math**
    - 7.6.2 Date**
    - 7.6.3 String**
    - 7.6.4 Other functions**
  - 7.7 What is ASP?**
  - 7.8 Understanding Client-Server model**
  - 7.9 Creating ASP pages**
    - 7.9.1 Using Visual Interdev**
    - 7.9.2 Using FrontPage**
  - 7.10 Objects**
    - 7.10.1 Building blocks of Objects**
    - 7.10.2 Properties**
    - 7.10.3 Methods**
    - 7.10.4 Instances**
      - 7.10.4.1 Response**
      - 7.10.4.2 Request**
      - 7.10.4.3 Application**
      - 7.10.4.4 Session**
      - 7.10.4.5 Server**
  - 7.11 Reading & Writing files on the Server**
    - 7.11.1 Server side includes**
    - 7.11.2 SSI**
    - 7.11.3 Redirecting users**
    - 7.11.4 Executing and transferring control to another ASP**
  - 7.12 Accessing files and folders**
    - 7.12.1 Debugging ASP scripts**
    - 7.12.2 Handling errors**
  - 7.13 Connecting to a Database**
    - 7.13.1 Connection Object**
      - 7.13.1.1 Using a DSN**
      - 7.13.1.2 Using a DSN-less**
    - 7.13.2 ADO**
    - 7.13.3 Reading & Displaying a Database using SQL**
      - 7.13.3.1 Inserting**
      - 7.13.3.2 Updating**
      - 7.13.3.3 Deleting**
      - 7.13.3.4 Database basics SQL**
    - 7.13.4 Validations with combination of JavaScript & ASP**

- 7.14 Cookies
  - 7.14.1 Constructing
  - 7.14.2 Calling
- 7.15 Session Creating and implementing

**Books recommended for reading and reference**

**Main Reading**

1. **Mastering HTML (BPB Publication) & HTML Unleashed 2<sup>nd</sup> Edition (SAMS Publication)**
2. **Teach Yourself Dream weaver in 24 hours (SAMS Publication)**
3. **Macromedia Dreamweaver in 24 hours By Betsy Bruce (Techmedia Publishers)**
4. **Mastering Dreamweaver By : David Crowder & Rhonda Crowder**
5. **The ABCs of Java Script (BPB Publication)**
6. **Beginning ASP Databases by John Kauffman (WROX Publication)**

**Supplementary Reading**

1. **Teach Yourself HTML 4 in 24 Hours (SAMS Publication)**
2. **Short order Macromedia Dreamweaver By: Steven Moniz**
3. **Master in JAVA SCRIPT (BPB Publication) & Java Script Source Book by Gordon McCOMB (WILEY Publication)**
4. **ASP Unleashed (SAMS Publication)**
5. **ASP 3.0 Programming reference (WROX Publication)**

## Practical

### Project

There will be a project undertaken by the student. The project is to be submitted to the Institute of Cooperative Management , Imphal with documentation in due course of time before completion of his PGDCA

#### 1. Salient Features of the Project

1.1 Will be individual effort only

Carries 100 marks

The Institute of Cooperative Management, Imphal will arrange for an expert to conduct the viva-voce.

#### 2. Guidelines for the project

2.1 The project should have been carried out, during the course, over a duration of 60 hrs. Every candidate should do a project individually and no grouping is allowed.

2.2 The project will be carried out either under the guidance of the institute or under the guidance of experts/professionals

2.3 The project report should be submitted covering the aspects specified in the PROJECT PROFILE.

2.4 Reports in fulfillment of any other examination/context will not be entertained.

2.5 The Institute of Cooperative Management , Imphal will arrange for viva voce of candidate relating to the project

2.6 The project report should have a certificate as per the Performa given below by the candidate

#### PERFORMA FOR CERTIFICATE FOR PROJECT

This is to certify that this is a bonafide record of the project work done satisfactorily at \_\_\_\_\_ by Mr./Ms. \_\_\_\_\_ (Registration No. \_\_\_\_\_) in partial fulfillment of PGDCA examination

This report or a similar report on the topic has not been submitted for any other examination and does not form part of any other course undergone by the candidate.

Signature of Candidate

PLACE

DATE

#### SIGNATURE

Name:

Designation :

Name & Seal of the Institution

#### 3. Project Profile

3.1 MODEL - 1

- 3.1.1 Topic for the project can be any subsystem of a system software or tool or any scientific or a fairly complex algorithmic situation.
- 3.1.2 The aim of this type is to highlight the abilities of algorithmic formulation, program and data flow representation, modular programming, optimized code preparation, systematic documentation and other associated aspects of software engineering. The project can be in C or C++ Language or VB and the program code should contain at least 300 lines. The assessment would be through the project report, which should portray :
  - 3.1.2.1 programming style, structure design, minimum coupling and high cohesion. No procedure should, however, be longer than 60 to 60 lines
  - 3.1.2.2 good commenting and annotating of the code and flow of representation, such that meaningful code, with good readability and ease of maintenance, results.
  - 3.1.2.3 design specifications, depicting the methods adopted and giving a simple data dictionary, test for each data, to cover name, type and validity aspects design specifications, depicting the methods adopted and giving a simple data dictionary, test for each data, to cover name, type and validity aspects
  - 3.1.2.4 test case samples, enough in number, to adequately cover the possible chances of common errors.
  - 3.1.2.5 User Manual, in its full entity.
- 3.2 **Model-2 : A typical business application**
  - 3.2.1 The aim of this type is to highlight the stages involved in a typical business oriented project development, though on a miniature scale and simulated environment. The appropriate use of DBMS towards any Business Applications, along with adequate level of system analysis and structured design and deployment of specific tools/products would be the underlying activity, in preparing this project.
  - 3.2.2 The subject has to be selected from a typical business/management application. The emphasis should be on selecting a system/subsystem which shows the DBMS and system analysis aspects to a greater degree. Any small and simple business system may be selected, although candidates are advised to use their knowledge and creativity, to select typical and intelligent applications, rather than run-of-the-mill themes, such as simple pay roll calculation or Issue-Return portion of an inventory scheme etc. The evaluation stage would give due weightage for theme selection, problem analysis, fact finding techniques and initial design, which are as close to real-life Indian business situations as possible.
  - 3.2.3 The project should be carried out in any of the X base family products. The code can be generated out of 4 GL Interface, like screen builder and report generator, application generator/program code generators, or can be totally hand-coded or a combination of both. The documentation is to contain the actual steps involved in such 4 GL - generated code and, possibly, a layout of such definition screen which has been filled by the candidate, to generate the code. The source is expected to be around 600 lines.
- 3.3 **Model 3 :**

**Project related to firmware development/networking/a specialized area of search & development**

The aim of this type of project is to boost the interest of the student in addressing problems related to networking/data-communication/firmware development like interfaces, device drivers, etc. or address/implement some specific research & development type of problems/algorithms.

The project could be implemented using C or C++ or a specialized package depending on the problem. If the project is related to hardware development the stress should be on the design aspects/improvements of the existing designs.

The project document must contain the detailed justification on the need for selecting the problem, its importance, its advantages/limitations and comparison with related work etc.



#### 4. Assessment of the Project

4.1 The assessment of the project would be through the project report, which should portray:  
 4.2 VIVA-VOCE OF THE PROJECT will be a part of assessment and details will be included in the instructions to candidates, issued by the Examining Authority.

- a) requirements leading to the project; those which were the result of system analysis
- b) the design aspect DBMS oriented documentation which describes the structure and organization of the database, well annotated source code, supplemental documentation, which can serve as a data analysis and data flow description
- c) a simple data dictionary of the elements, which form the structure. The number of tables/files, which make up the DBMS, should not be less than there.
- d) details about I/O screens and facilities, for on-screen querying printer oriented reports and built in housekeeping routines which, help disk management and file integrity, are to be included to a limited extent.
- e) details of acceptance tests which, should be in adequate number and should include error cases
- f) User Manual in its full entity

#### 5. Documentation of the Project

6.1 Requirement specification : will have sections as below :

- a) Application Area :  
eg Production/ Inventory/ Finance/ Marketing/ Human Resources Management/Library/Training etc.
- b) System/Subsystem :  
eg Invoicing & Accounts Receivables, Purchase & Accounts payable Budget & Accounts with variance analysis :  
Production/Sales monitoring; Material Requirement Planning (MRP) etc.
- c) End User(s) : e.g. Finance Controller, Marketing Manager, Production Manager, Personnel Depts.
- d) Main Output required :

Type	Medium	Frequency
e.g. Reports/StatementPrinter		Annual/Monthly/Daily/Qtrly.
Responses to Queries VDU		As and when needed
Cumulative Sales	Disk	Monthly

- e) 1) Brief description of the present, if any.  
2) Need for review-list major deficiencies/defects in the present system
- g) User Profile : There may be several groups with different needs.
- h) Performance criteria for the proposed system eg :  
The following aspects are expected to be handled by the new system (if applicable)
  - i) Volume of transaction (Data handling)
  - ii) Control aspects
  - iii) Timeliness
  - iv) Archival

## 5.2 Data Dictionary

5.2.1 This should give a catalogue of the (Data) elements used in the system/sub system developed.

5.2.2 The following are the details required. Write NA if NOT applicable.

Data Name

Aliases, if any

Length (Size)

Type, Numeric

Alpha

Binary etc.

Is it an input or program/system generated ?

SOURCE :

Validity Criterion : (Minimum, Maximum etc.)

May also relate to other data items (interrelated) Default value, if any

Security-access rights-who can read/modify. Where used in the system.

a) Reference to Data Structure/File

b) Procedures/Modules which use

## 6.3 User Manual

Contents : Suggested Chapter

1. Installation :

1.1 Hardware Requirements

1.2 System Requirements

1.3 Installation Procedure - including security aspects like password, protection, backup, controls etc.

2. Menu choices and their actions-Screen formats

3. Error Messages

4. Output

6. Sample Case

This is equally applicable to direct candidates.

## 6. Final Project Report

6.1 The final project report may contain broadly the following sections

i) Certificate as given in Section 2.8

ii) Contents

iii) Abstract/Synopsis : (2-3 pages)

giving a brief of the problem area, its importance, need, how it has been implemented, testing/results, advantages and limitation of the system.

Chapter 1 : Introduction

- Objective of the system
- Justification and need for the system
- Advantages of the system
- Previous work or related systems, how they are used

Chapter 2 : Design of the system

- Hardware, Software requirements
- System requirements
- System specifications
- Block diagram of the system

- DFDs/Algorithm/Flow Charts etc.  
along with explanation/descriptions

Chapter 3 : Implementation & Coding

Chapter 4 : Testing & Test results : sample test data/ output screen printouts etc. need to be presented with description

Chapter 6 : Results and conclusion

Appendix :  
A. Program listings  
B. Details about the specialized package (if any)  
C. Details of hardware products/chip specifications (if any)  
D. Any other background material

# **PGDCA**

# **1<sup>st</sup> Semester**

# **Syllabus**



**INSTITUTE OF COOPERATIVE MANAGEMENT, IMPHAL  
LAMPHELPAT**