

## **Computer Graphics and Multimedia (4-1-2)**

### **Evaluation:**

|          | Theory | Practical | Total |
|----------|--------|-----------|-------|
| Internal | 30     | 20        | 50    |
| Final    | 50     | -         | 50    |
| Total    | 80     | 20        | 100   |

### **Course Objectives:**

1. To introduce basic concepts of 2D and 3D graphics.
2. The provide knowledge of various graphics algorithms and their techniques.
3. The provide knowledge of multimedia and its various components.

### **Course Contents:**

| <b>Unit No.</b> | <b>Topic</b>                                                                                                                                                                                                                                                                                                                                                | <b>Hours</b> |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1.              | <b>Introduction of CG and Basic concepts of Drawing</b><br>1.1 Introduction and Development of Graphics system<br>1.2 Application of Computer graphics                                                                                                                                                                                                      | 2            |
| 2.              | <b>Overview of Graphics system</b><br>2.1 Input Devices: Data Glove, Touch Panel, Digitizers<br>2.2 Video display devices: Refresh cathode-Ray Tubes, Color CRT display, Flat-panel display(LCD, LED and Plasma Display)<br>2.3 Frame Buffer, Video Controller<br>2.4 Raster-Scan systems<br>2.5 Random-scan systems,                                       | 6            |
| 3.              | <b>2D Graphics algorithm</b><br>3.1 DDA line drawing algorithm<br>3.2 Bresenham's line drawing algorithm<br>3.3 Midpoint Circle Algorithm                                                                                                                                                                                                                   | 4            |
| 4.              | <b>2D Graphics transformations and Viewing</b><br>4.1 Two-Dimensional Geometric transformations: Translation, Rotation, Scaling,<br>4.2 Composite transformation, Homogenous Co-Ordinate System<br>4.3 Two-Dimensional object to screen viewing(Window to viewport co-ordinate transformation only)<br>4.4 Clipping and Cohen Sutherland clipping algorithm | 6            |
| 5.              | <b>3D Graphics</b><br>5.1 Non planner surfaces(Bezier Curve and surfaces)<br>5.2 Methods of generating non-planner surfaces, Polygon Table, Polygon mesh and Plane equation<br>5.3 Three-Dimensional Geometric transformations: Translation, Rotation, Scaling,                                                                                             | 8            |



- 5.4 Three- Dimensional object to screen viewing
- 5.5 Parallel Projection(Oblique and orthographic), Perspective Projections
- 5.6 Visible surface detection methods(Back face, Z buffer and Scanline)

|                                                                                                                                                                                            |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>6. Illumination and Rendering</b>                                                                                                                                                       | <b>6</b>  |
| 6.1 Light Sources                                                                                                                                                                          |           |
| 6.2 Illumination Models: Ambient, Diffuse and Specular                                                                                                                                     |           |
| 6.3 Polygon-Rendering methods: Constant-Intensity shading, Gouraud Shading, Phong shading, Fast phong shading,                                                                             |           |
| 6.4 Introduction to OpenGL and its application                                                                                                                                             |           |
| <b>7. Introduction to Multimedia</b>                                                                                                                                                       | <b>4</b>  |
| 7.1 Definitions                                                                                                                                                                            |           |
| 7.2 Application of Multimedia                                                                                                                                                              |           |
| 7.3 Multimedia Teams (Project Manager, Multimedia Designer, Interface Designer, Writer, Video Specialist, Audio Specialist, Multimedia Programmer, The Sum of the parts)                   |           |
| <b>8. Media Software</b>                                                                                                                                                                   | <b>6</b>  |
| 8.1 Basic Tools (Painting and Drawing Tools, 3-D Modeling and Animation Tools, Image Editing Tools, OCR Software, Sound Editing Programs, Animation, Video and Digital movies and Players) |           |
| 8.2 Multimedia Authoring Tools, Types of Authoring Tools, Card and Page-bases Authoring Tools, Icon-Based Authoring Tools, Time-Based Authoring Tools, Object-Oriented Tools               |           |
| <b>9. Multimedia Building Blocks</b>                                                                                                                                                       | <b>12</b> |
| 9.1 Text                                                                                                                                                                                   |           |
| 9.1.1 Typefaces and fonts                                                                                                                                                                  |           |
| 9.1.2 Design Issue                                                                                                                                                                         |           |
| 9.1.3 Beyond the Basics                                                                                                                                                                    |           |
| 9.1.4 Bitmap, True Type, Postscript (ATM)                                                                                                                                                  |           |
| 9.1.5 The Jaggies                                                                                                                                                                          |           |
| 9.1.6 Fontographer, Font Monger, Font Chameleon                                                                                                                                            |           |
| 9.1.7 Icons and Symbols                                                                                                                                                                    |           |
| 9.1.8 Animating text and 3D effects                                                                                                                                                        |           |
| 9.1.9 Logo Motion, Tapestry                                                                                                                                                                |           |
| 9.1.10 ASCLL- standard only 0-127                                                                                                                                                          |           |
| 9.2 Sound and Music                                                                                                                                                                        |           |
| 9.2.1 The power of sound                                                                                                                                                                   |           |
| 9.2.2 Multimedia system sounds                                                                                                                                                             |           |
| 9.2.3 MIDI Vs. Digital Audio-Choosing between MIDI and Digital Audio                                                                                                                       |           |
| 9.2.4 Digital Audio                                                                                                                                                                        |           |
| 9.2.5 Professional Sound standard (Red Book Standard)-Quality and space considerations                                                                                                     |           |
| 9.3 Color Theory                                                                                                                                                                           |           |
| 9.3.1 Electromagnetic Spectrum                                                                                                                                                             |           |



- 9.3.2 ROYGBIV: 400nm-600nm
- 9.3.3 Additive Color:- RGB
- 9.3.4 Subtractive Color-CMYK
- 9.3.5 Color Models-RGB,HBS,BSL,CIE YUV
- 9.3.6 Perception of Color
- 9.3.7 Graphics and Imaging

#### 9.4 Color Depth and File Size

- 9.4.1 Palette Management
- 9.4.2 Importing Graphics (Painting vs Drawing, Photoshop and Illustrator, Scanning, Photo CD, Digital Photography, still images, Screen Capturer (CMb-Shft-3 or Print screen)

### **10. Animation and Video**

**10**

#### 10.1 Animation

- 10.1.1 The Power of Motion
- 10.1.2 Principle of Animation
- 10.1.3 Animation Technique
- 10.1.4 Animation file formats

#### 10.2 Video

- 10.2.1 Broadcast Video standards (NTSC, PAL SECAM, HDTV)
- 10.2.2 Integrating computer and Television
- 10.2.3 Recording Formats
- 10.2.4 Video compression (JPEG, MPEG, DVI Indeo, Other Compression Methods, Optimizing Video Files

### **Laboratory:**

1. Implementation of line drawing algorithms using C/C++
2. Implementation of mid-point circle drawing algorithm using C/C++
3. Implementation of Two-Dimensional Transformation (Translation, Rotation, Scaling)
4. Implementation of cohen-sutherland clipping algorithm
5. Demonstration of multimedia(Integration of multimedia component)
6. Demonstration of Video Compression Technique using library file
7. Demonstration of Animation technique using any programming language

### **Text Books:**

1. Donald Hern and M. Pauline Baker: Computer Graphics, Prentice-Hall.
2. Tay Vaughan: Multimedia: Making it work, 4th ed, Osborne McGraw-Hill Publisher; 1998

### **Reference Books:**

1. Malay K. Pakhira, Computer Graphics Multimedia and Animation Second Edition PHI Publication.
2. Computer Graphics: Principles and Practice in C (2nd Edition) [James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes]



## **Database Management System (3-1-3)**

### **Evaluation:**

|           | Theory | Practical | Total |
|-----------|--------|-----------|-------|
| Sessional | 30     | 20        | 50    |
| Final     | 50     | -         | 50    |
| Total     | 80     | 20        | 100   |

### **Objectives:**

The objective of this course is to provide fundamental concept, theory and practices in design and implementation of DBMS.

### **Course Contents:**

#### **1. Introduction**

- (4 hrs)
- 1.1 Concept and applications
  - 1.2 Objectives and Evolution
  - 1.3 Needs of DBMS
  - 1.4 Data abstraction
  - 1.5 Data independence
  - 1.6 Schema and Instances
  - 1.7 Concept of DDL, DML and DCL
  - 1.8 Database Manager and users

#### **2. Data Models**

- (4hrs)
- 2.1 Logical, Physical and Conceptual Model
  - 2.2 E-R Model
  - 2.3 Relation with UML class diagrams
  - 2.4 2.4Alternate data models (Network Data Model, hierarchical Data Model)

#### **3. Relational Model**

- (4 hrs)
- 3.1 Definitions and terminology
  - 3.2 Structure of relational databases
  - 3.3 The relational algebra
  - 3.4 Schema and Views
  - 3.5 Data dictionary

#### **4. Relational Database Query languages**

( 8 hrs)

- 4.1 SQL – features of SQL, queries and sub-queries, Join operations, set operations and other SQL constructs
- 4.2 DDL and DML queries in SQL
- 4.3 Stored procedures
- 4.4 QBE

#### **5. Database Constraints and Relational Database Design**

( 8 hrs)

- 5.1 Introduction
- 5.2 Integrity constraints
- 5.3 Referential Integrity
- 5.4 Assertions and Triggers



- 5.5 Functional dependencies
- 5.6 Normalization and Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF)
- 5.7 Multivalued Dependencies
- 5.8 Decomposition of relation schemes

|                                                                                       |                |
|---------------------------------------------------------------------------------------|----------------|
| <b>6. Security</b>                                                                    | <b>(3 hrs)</b> |
| 6.1 Needs of security                                                                 |                |
| 6.2 Security and integrity violations                                                 |                |
| 6.3 Access control                                                                    |                |
| 6.4 Authorization                                                                     |                |
| 6.5 Security and Views                                                                |                |
| 6.6 Encryption and decryption                                                         |                |
| <b>7. Query Processing</b>                                                            | <b>(3 hrs)</b> |
| 7.1 Introduction to query processing                                                  |                |
| 7.2 Equivalence of expressions                                                        |                |
| 7.3 Query cost estimation                                                             |                |
| 7.4 Query Optimization                                                                |                |
| <b>8. File organization and indexing</b>                                              | <b>(4 hrs)</b> |
| 8.1 Disks and storage                                                                 |                |
| 8.2 Organization of records into blocks                                               |                |
| 8.3 File organizations - The sequential and the indexed sequential file organizations |                |
| 8.4 B+ Tree index                                                                     |                |
| 8.5 Hash index                                                                        |                |
| <b>9. Crash Recovery</b>                                                              | <b>(3 hrs)</b> |
| 9.1 Failure classification                                                            |                |
| 9.2 Concept of log-based recovery and shadow paging                                   |                |
| 9.3 Data Backup/Recovery                                                              |                |
| 9.4 Remote backup system                                                              |                |
| <b>10. Transaction Processing and Concurrency Control</b>                             | <b>(4 hrs)</b> |
| 10.1 Introduction to Transactions                                                     |                |
| 10.2 ACID properties of transaction                                                   |                |
| 10.3 Schedules and Serializability                                                    |                |
| 10.4 Concepts of locking for concurrency control                                      |                |
| <b>11. Advanced Database concepts</b>                                                 | <b>(3 hrs)</b> |
| 11.1 Object-Oriented Model                                                            |                |
| 11.2 Object-Relational Model (ORM)                                                    |                |
| 11.3 Distributed databases                                                            |                |
| 11.4 Concepts of Data Warehouses                                                      |                |

#### **Laboratory:**

There shall be enough laboratory exercises based on some RDBMS (like ORACLE, MS-SQL server, MySQL, etc) to complement theoretical part studied. An individual project should be given to each student. 10% of sessional marks should be allocated for evaluation for lab works and project.



**Text Book:**

H. F. Korth and A. Silberschatz, *Database System Concepts*, McGraw Hill.

**Reference Books:**

1. K. Majumdar and P. Bhattacharaya, *Database Management Systems*, Tata McGraw Hill, India.
2. R. E. Mani and S. C. Nevathe, *Fundamentals of Database Systems*, Benjamin/Cummings Publishing Co. Inc.
3. G.C Everest, *Database Management*, McGraw Hill.



## Numerical Methods (3-1-3)

### Evaluation:

|          | Theory | Practical | Total |
|----------|--------|-----------|-------|
| Internal | 30     | 20        | 50    |
| Final    | 50     | -         | 50    |
| Total    | 80     | 20        | 100   |

### Course Objectives:

1. To introduce numerical methods for interpolation, regressions, and root finding to the solution of problems.
2. To solve elementary matrix arithmetic problems analytically and numerically.
3. To find the solution of ordinary and partial differential equations.
4. To provide knowledge of relevant high level programming language for computing, implementing, solving, and testing of algorithms.

### Course Contents:

- 1. Solution of Nonlinear Equations** (10 hrs)  
1.1 Review of calculus and Taylor's theorem  
1.2 Errors in numerical calculations  
1.3 Bracketing methods for locating a root, initial approximation and convergence criteria  
1.4 False position method, secant method and their convergence, Newton's method and fixed point iteration and their convergence.
- 2. Interpolation and Approximation** (7 hrs)  
2.1 Lagrangian's polynomials  
2.2 Newton's interpolation using difference and divided differences  
2.3 Cubic spline interpolation  
2.4 Curve fitting: least squares lines for linear and nonlinear data
- 3. Numerical Differentiation and Integration** (5 hrs)  
3.1 Newton's differentiation formulas  
3.2 Newton-Cote's, Quadrature formulas  
3.3 Trapezoidal and Simpson's Rules  
3.4 Gaussian integration algorithm  
3.5 Romberg integration formulas.
- 4. Solution of Linear Algebraic Equations** (10 hrs)  
4.1 Matrices and their properties  
4.2 Elimination methods, Gauss Jordan method, pivoting  
4.3 Method of factorization: Dolittle, Crout's and Cholesky's methods  
4.4 The inverse of a matrix  
4.5 Ill-Conditioned systems  
4.6 Iterative methods: Gauss Jacobi, Gauss Seidel, Relaxation methods  
4.7 Power method.



|                                                                                                  |         |
|--------------------------------------------------------------------------------------------------|---------|
| <b>5. Solution of Ordinary Differential Equations</b>                                            | (8 hrs) |
| 5.1 Overview of initial and boundary value problems                                              |         |
| 5.2 The Taylor's series method                                                                   |         |
| 5.3 The Euler Method and its modifications                                                       |         |
| 5.4 Huen's method                                                                                |         |
| 5.5 Runge-Kutta methods                                                                          |         |
| 5.6 Solution of higher order equations                                                           |         |
| 5.7 Boundary Value problems: Shooting method.                                                    |         |
| <b>6. Solution of Partial Differential Equations</b>                                             | (5 hrs) |
| 6.1 Review of partial differential equations                                                     |         |
| 6.2 Elliptical equations, parabolic equations, hyperbolic equations and their relevant examples. |         |

### Laboratory:

Use of Matlab/Math-CAD/C/C++ or any other relevant high level programming language for applied numerical analysis. The laboratory experiments will consist of program development and testing of:

1. Solution of nonlinear equations
2. Interpolation, extrapolation, and regression
3. Differentiation and integration
4. Linear systems of equations
5. Ordinary differential equations (ODEs)
6. Partial differential equations (PDEs)

### Text Books:

1. Gerald, C. F. & Wheatly, P. O. *Applied Numerical Analysis* (7<sup>th</sup> edition). New York: Addison Wesley Publishing Company.
2. Guha, S. & Srivastava, R. *Numerical Methods: For Engineers and Scientists*. Oxford University Press.
3. Grewal, B. S. & Grewal, J. S. *Numerical Methods in Engineering & Science* (8<sup>th</sup> edition). New Delhi: Khanna publishers. 2010.
4. Balagurusamy, E. *Numerical Methods*. New Delhi: TataMcGraw Hill. 2010.

### References:

1. Moin, Parviz. *Fundamentals of Engineering Numerical Analysis*. Cambridge University Press, 2001.
2. Lindfield, G. R. & Penny, J. E. T. *Numerical Methods: Using MATLAB*. Academic Press, 2012.
3. Schilling, J. & Harris, S.L. *Applied Numerical Methods for Engineers using MATLAB and C*. Thomson publishers, 2004.
4. Sastry, S. S. *Introductory Methods of Numerical Analysis* (3<sup>rd</sup> edition). New Delhi: Prentice Hall of India. 2002.
5. Rao, S. B. & Shantha, C. K. *Numerical Methods with Programs in Basic, Fortran and Pascal*. Hyderabad: Universities Press. 2000.
6. Pratap, Rudra. *Getting Started with MATLAB*. Oxford University Press. 2010.
7. Vedamurthy, V.N. & Lyengar, N. *Numerical Methods*. Noida: Vikash Publication House. 2009.



## **Operating System (3-1-2)**

### **Evaluation:**

|          | Theory | Practical | Total |
|----------|--------|-----------|-------|
| Internal | 30     | 20        | 50    |
| Final    | 50     | -         | 50    |
| Total    | 80     | 20        | 100   |

### **Objectives:**

- To provide the basic concepts and interface of Operating systems.
- To get familiarize with the features of modern operating systems.
- To get familiarize with different functions of the operating systems.

### **Course Contents:**

| <b>Unit</b> | <b>Topic</b>                                                                                                                                                                                                                                                                                                                                                  | <b>Hours</b> |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>1.</b>   | <b>Introduction to Operating System</b>                                                                                                                                                                                                                                                                                                                       | <b>2</b>     |
|             | 1.1 Introduction and history (Generation of OS)<br>1.2 Objectives (Resource manager and extended machine)<br>1.3 Types of Operating system<br>1.4 Function of Operating system<br>1.5 Different Views of OS                                                                                                                                                   |              |
| <b>2.</b>   | <b>Operating System Structure</b>                                                                                                                                                                                                                                                                                                                             | <b>2</b>     |
|             | 2.1 Introduction<br>2.2 Layered System<br>2.3 Kernel<br>2.4 Types of kernel ( Monolithic/Macro Kernel and Micro/Exo-kernel)<br>2.5 Client-server Model<br>2.6 Virtual Machines<br>2.7 Shell                                                                                                                                                                   |              |
| <b>3.</b>   | <b>Process Management</b>                                                                                                                                                                                                                                                                                                                                     | <b>14</b>    |
|             | <b>3.1 Process Concepts (2 Hours)</b>                                                                                                                                                                                                                                                                                                                         |              |
|             | 3.1.1 Definitions of Process<br>3.1.2 The Process Model<br>3.1.3 Process States<br>3.1.4 Process State Transition<br>3.1.5 The process Control Block<br>3.1.6 Operations on processes (creation, Termination, Hierarchies, Implementation)<br>3.1.7 Cooperating Processes<br>3.1.8 System calls ( Process management, File management,, Directory management) |              |
|             | <b>3.2 Threads (1 hr)</b>                                                                                                                                                                                                                                                                                                                                     |              |
|             | 3.2.1 Definitions of Threads<br>3.2.2 Types of Thread Process ( Single and multithreaded process)<br>3.2.3 Benefits of Multithread<br>3.2.4 Multithreading Models (Many-to-one model, One-to-One Model, Many-to many model)                                                                                                                                   |              |



- 3.3 Inter-process Communication and synchronization (5 hrs)**
- 3.3.1 Introduction
  - 3.3.2 Race condition
  - 3.3.3 Critical Regions
  - 3.3.4 Avoiding Critical Region : Mutual Exclusion and Serializability
  - 3.3.5 Mutual exclusion conditions
  - 3.3.6 Proposals for Achieving Mutual exclusion : disabling interrupts, Lock variable, Strict Alteration ( Peterson's Solution), The TSL instruction
  - 3.3.7 Sleep and Wakeup
  - 3.3.8 Types of Mutual Exclusion (Semaphore, Monitors, Mutexes, Message Passing, Bounded buffer)
  - 3.3.9 Serializability: Locking Protocols and Time Stamp Protocols
  - 3.3.10 Classical IPC Problems (Dining Philosophers Problems, The readers and writers problem, the Sleeping barber's problem)

**3.4 Process Scheduling ( 6 hrs)**

- 3.4.1 Basic Concept
- 3.4.2 Type of Scheduling (Preemptive scheduling, Nonpreemptive scheduling, batch, Interactive, real time scheduling)
- 3.4.3 Scheduling Criteria or Performance Analysis
- 3.4.4 Scheduling Algorithm (Round-robin, First come first served, Shortest-job-first, Shortest process next, Shortest remaining Time next, real time, priority fair share, guaranteed, Lottery scheduling, HRN, multiple Queue, Multilevel feedback queue)
- 3.4.5 Some Numerical examples on scheduling

**4. Deadlocks**

4

- 4.1 System Model
- 4.2 System Resources: Preemptable and Non preemptable
- 4.3 Conditions for Resource Deadlocks
- 4.4 Deadlock Modeling
- 4.5 The OSTRICH Algorithm
- 4.6 Method of Handling Deadlocks
- 4.7 Deadlock Prevention
- 4.8 Deadlock Avoidance: Bunker's Algorithm
- 4.9 Deadlock Detection: Resource allocation graph
- 4.10 Recovery from Deadlock
- 4.11 Starvation

**5. Memory Management**

9

**5.1 Basic memory management ( 3 Hours)**

- 5.1.1 Introduction
- 5.1.2 Memory hierarchy
- 5.1.3 Logical versus Physical Address Space
- 5.1.4 Memory Management with Swapping: Memory Management with bitmaps and with linked list
- 5.1.5 Memory Management without Swapping
- 5.1.6 Contiguous-memory Allocation: Memory protection, Memory Allocation, Fragmentation (Inter fragmentation and external fragmentation)
- 5.1.7 Non-contiguous memory allocation
- 5.1.8 Fixed Partitioning vs. Variable Partitioning
- 5.1.9 Relocation and protection
- 5.1.10 Coalescing and Compaction



## **5.2 Virtual Memory (6 Hours)**

- 5.2.1 Background
- 5.2.2 Paging
- 5.2.3 Structure of Page Table: Hierarchical page table, Hashed page table, Inverted page table, Shared Page Table
- 5.2.4 Block Mapping vs. direct mapping
- 5.2.5 Demand paging
- 5.2.6 Page replacement and Page Faults
- 5.2.7 Page replacement algorithms: FIFO, OPR, LRU, SCP
- 5.2.8 Some numerical examples on page replacement
- 5.2.9 Thrashing
- 5.2.10 Segmentation
- 5.2.11 Segmentation with Paging

## **6. Input/ Output Device Management**

- 6.1 Principle of I/O Hardware: I/O Devices, Device Controllers, Memory Mapped I/O, Direct memory Access
- 6.2 Principle of I/O Software: Goals of I/O Software, Program I/O, Interrupt –driven I/O, I/O Using DMA
- 6.3 I/O Software Layers: Interrupts Handler, Device drivers, Device Independent I/O Software, User –Space I/o Software
- 6.4 Disk: Disk Hardware,
- 6.5 Disk Scheduling: Seek Time, Rational Delay, Transfer Time
- 6.6 Disk Scheduling Algorithms: FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, Lock Scheduling
- 6.7 RAID

5

## **7. File System Interface Management**

- 7.1 File concept: File Naming, File structure, File Type, File Access, File Attributes, File Operation, and File descriptors
- 7.2 Directories: Single-level directory systems, Hierarchical Directory Systems, Path names, Directory operation
- 7.3 Access Methods: Sequential, Direct
- 7.4 Protection: Types of access, Access control List, Access control Matrix
- 7.5 File System Implementation: Contiguous allocation, Linked list allocation, linked list allocation using an Index, I-nodes, security and multimedia files

3

## **8. Security Management**

2

- 8.1 Introduction
- 8.2 Security problems
- 8.3 User Authentication: Passwords, password Vulnerabilities, Encrypted password, one time password and Biometrics password
- 8.4 User Authorization
- 8.5 Program Threats: Trojan Horse, Trap Door, Stack and Buffer overflow,
- 8.6 System Threats: Worms, Viruses, Denial of Services

## **9. Distributed Operating System**

4

- 9.1 Introduction
- 9.2 Advantages of distributed system over centralized System
- 9.3 Advantages of distributed system over Independent PCs
- 9.4 Disadvantages of distributed System
- 9.5 Hardware and Software Concepts
- 9.6 Communication in distributed systems
- 9.7 ATM

3



- 9.8 Layered protocols
- 9.9 The Client server Model
- 9.10 Message passing
- 9.11 Remote procedure Call
- 9.12 Process in distribution system
- 9.13 Clock Synchronization

## 10. Case Study

- 10.1 DOS and Windows Operating System
- 10.2 Unix Operating System
- 10.3 Linux Operating System

2

## 11. Future Issues

- 11.1 Memory wall
- 11.2 Some future of OS about speed (will the web browser swallow the OS)

1

## Practical/Lab works

| S. N. | Title                                                  | Description                                                                                                                                                                                      | Requirements                                                                            |
|-------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1     | Familiarize with terminology                           | Introduction and demonstration with Program, Process, threads, system calls, shells and kernels, user interface, type of operating systems, operating systems structure and directory hierarchy. | A machine with Linux operating systems                                                  |
| 2     | Study of system calls and their organization           | Demonstration of common systems calls-fork(), open(), close(), write(), wait(), kill(), etc and implementation of any one command using C/C++ programming language                               | Use the terminal or any shell to demonstrate systems call using process tracing command |
| 3     | Simulation of Process scheduling Algorithm             | Implementation of process scheduling algorithms- FCFS, SJF, RR and priority                                                                                                                      | Use any high level programming language                                                 |
| 4     | Study of Inter-process communication methods           | Study and Implementation of Monitor, Semaphore, consumer and producer problems                                                                                                                   | Use any high level programming                                                          |
| 5     | Study of memory management Schemes and data structures | Study and Implantation of the memory management schemes and algorithms                                                                                                                           | Use features of operating systems                                                       |
| 6     | Implementation of Bankers algorithm                    | Resource allocation schemes of scheduler to prevent the deadlock                                                                                                                                 | User C/C++ programming language.                                                        |
| 7     | Implementation of Disk arm scheduling algorithms       | Write a program for disk arm scheduling through FCFS, SJF, SCAN, C-SCAN for minimization of movement                                                                                             | Use C /C++ programming language.                                                        |

### Text Book:

Andrew s. Tanenbaum, "Modern Operating System", PHI, 6<sup>th</sup> Ed. 2011/12

### Reference Books:

1. Silberschatz, P.B. Galvin, G. Gagne "Operating System Concepts", Wiley, 8<sup>th</sup> Ed.
2. Andrew s. Tanenbaum, "Distributed Operating System", Pearson
3. D M Dhamdhere , "System Programming and Operating System" - Tata McGraw-Hill , 2009
4. P. Pal Choudhury, "Operating Systems Principles and Design", PHI, 2011



## **Visual Programming (3-1-3)**

### **Evaluation:**

|          | Theory | Practical | Total |
|----------|--------|-----------|-------|
| Internal | 30     | 20        | 50    |
| Final    | 50     | -         | 50    |
| Total    | 80     | 20        | 100   |

### **Course Objectives:**

1. To describe how executable code is created with a complied language.
2. To apply the power of .Net technologies.
3. To familiarize with VB.Net editor and to create fairly sophisticated applications.
4. To know the concept of object oriented event driven programming.
5. To familiarize with the graphics and local resources handling.
6. To build application with integration of VB.Net and Database.

### **Course Contents:**

| <b>Unit No</b>                               | <b>Topic</b>                                                                                                                                                                                                                                                                                                                                                                | <b>Hours</b> |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>1. Introduction</b>                       | 1.1 Introduction to .NET<br>1.2 Introduction to .NET framework and common language run time<br>1.3 New Features of .NET Framework 4.0<br>1.4 Framework class library<br>1.5 Meta Data and Assemblies<br>1.6 LINQ<br>1.7 Introduction to visual studio<br>1.8 Project basics<br>1.9 Types of project in .Net.<br>1.10 Simple project demo both windows base and console base | <b>4</b>     |
| <b>2. The VB.NET Basic</b>                   | 2.1 Variables and constant<br>2.2 Variables –Declaring<br>2.3 Data Types<br>2.4 Forcing variables declarations<br>2.5 Strings<br>2.6 Scope & lifetime of a variable<br>2.7 Data type conversion<br>2.8 Operators<br>2.9 Arrays, types of arrays<br>2.10 Enumeration                                                                                                         | <b>5</b>     |
| <b>3. The VB.NET Control flow statements</b> | 3.1 Introduction<br>3.2 Conditional Statements(if and switch case)                                                                                                                                                                                                                                                                                                          | <b>5</b>     |



|                                                                                                                                                                                                                                                                                    |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 3.3 Iteration Statements (Do while , While, For loop, for each and For Each-Next loop)                                                                                                                                                                                             |           |
| 3.4 Jump statements: go to, exit ,continue and return                                                                                                                                                                                                                              |           |
| 3.5 Msg box & Input box                                                                                                                                                                                                                                                            |           |
| <b>4. The VB.Net Procedure, function, Exceptions handling</b>                                                                                                                                                                                                                      | <b>7</b>  |
| 4.1 Sub Routines                                                                                                                                                                                                                                                                   |           |
| 4.2 functions                                                                                                                                                                                                                                                                      |           |
| 4.3 type arguments                                                                                                                                                                                                                                                                 |           |
| 4.4 optional arguments                                                                                                                                                                                                                                                             |           |
| 4.5 returning value from function                                                                                                                                                                                                                                                  |           |
| 4.6 Scope                                                                                                                                                                                                                                                                          |           |
| 4.6.1 Block Scope                                                                                                                                                                                                                                                                  |           |
| 4.6.2 Procedure Scope                                                                                                                                                                                                                                                              |           |
| 4.6.3 Module Scope                                                                                                                                                                                                                                                                 |           |
| 4.6.4 Namespace Scope.                                                                                                                                                                                                                                                             |           |
| 4.7 Introduction of exception                                                                                                                                                                                                                                                      |           |
| 4.8 Unstructured Exception Handling                                                                                                                                                                                                                                                |           |
| 4.9 Structured Exception Handling                                                                                                                                                                                                                                                  |           |
| 4.10 Raising an Exceptional Intentionally (by using unstructured method)                                                                                                                                                                                                           |           |
| 4.11 Exception filtering in the Catch Block                                                                                                                                                                                                                                        |           |
| 4.12 Multiple Catch                                                                                                                                                                                                                                                                |           |
| 4.13 Finally Statement                                                                                                                                                                                                                                                             |           |
| 4.14 Throwing an Exception                                                                                                                                                                                                                                                         |           |
| 4.15 Throwing a Custom Exception                                                                                                                                                                                                                                                   |           |
| <b>5. The VB.Net Object Oriented Programming</b>                                                                                                                                                                                                                                   | <b>6</b>  |
| 5.1 Classes and object                                                                                                                                                                                                                                                             |           |
| 5.2 Creating constructor & destructor                                                                                                                                                                                                                                              |           |
| 5.3 creating and Implementation inheritance                                                                                                                                                                                                                                        |           |
| 5.4 Implementing shadowing                                                                                                                                                                                                                                                         |           |
| 5.5 Access Modifiers                                                                                                                                                                                                                                                               |           |
| 5.6 Creating abstract classes and methods                                                                                                                                                                                                                                          |           |
| 5.7 Over loading and overriding                                                                                                                                                                                                                                                    |           |
| <b>6. The VB.Net Forms and User Inter face Elements</b>                                                                                                                                                                                                                            | <b>10</b> |
| 6.1 Loading                                                                                                                                                                                                                                                                        |           |
| 6.2 Showing and hiding forms                                                                                                                                                                                                                                                       |           |
| 6.3 controlling One form within another                                                                                                                                                                                                                                            |           |
| 6.4 Creating MDI application                                                                                                                                                                                                                                                       |           |
| 6.5 Components of Windows Form                                                                                                                                                                                                                                                     |           |
| 6.6 Timer. Their properties, methods, and events                                                                                                                                                                                                                                   |           |
| 6.7 The VB.Net Menus, and Built-in Dialog Boxes                                                                                                                                                                                                                                    |           |
| 6.8 Labels, Text box, Ritch Text Box, Masked Text Box Control, Buttons, Checkboxes ,Radio Buttons List boxes, Checked List Boxes, Split Container Control, Combo Box, Picture boxes, Scroll bar, Group Box, Image List ,Tree View, List View, Tab Control, Panels, Month Calendar, |           |



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|----------------------------------------------------------------------------------------------------------|---|
| <b>7. The VB.Net Graphics and File Operations</b>                                                        | 4 |
| 7.1 Introduction to Graphics Handling                                                                    |   |
| 7.2 Drawing and fillings Different type of graphics: Circle, line, Rectangle, square, Drawing Image etc. |   |
| 7.3 Writing and Reading text data                                                                        |   |
| 7.4 Reading and Writing Binary data                                                                      |   |
| <b>8. Database programming with ADO.NET</b>                                                              | 7 |
| 9.1 Over view of ADO.NET                                                                                 |   |
| 9.2 Architecture of ADO.NET                                                                              |   |
| 9.3 Accessing Data using Server Explorer                                                                 |   |
| 9.4 Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB                         |   |
| 9.5 Display Data on data bound controls and data on data grid.                                           |   |

**Text Book:**

VB.NET 2010 Programming Black Book – Steven Kogent (Dreamtech pub.)

**Reference Books:**

1. Introduction to .NET framework-Wrox publication
2. Mastering VB.NET by Evangelos petroutsos- BPB publications
3. Visual Studio 2010 and .NET 4 Authors: Istvan Novak, Andras Velvart, Adam Granicz. ISBN-0470499486.
4. VB.NET Programming Black Book – Steven Holzner (Dreamtech pub.)



## **Project II (0-0-2)**

### **Evaluation:**

|          | Theory | Practical | Total |
|----------|--------|-----------|-------|
| Internal |        | 50        | 50    |
| Final    |        | 50        | 50    |
| Total    |        | 100       | 100   |

### **Course Objectives:**

1. To develop the concept about programming using PLT.
2. Implementing various programming technique using SAD.
3. To develop the real based project using programming language VB .Net and database System language.

**Course Duration: 30 hours**

### **Course Contents:**

The following are documentation guidelines to be given to each student along with an assignment that should cover most of the main topics given in the framework.

- Cover Page
  - Executive summary
  - Acknowledgment
1. Introduction
  2. The Assignment project
  3. Objective of Assignment project
  4. Time Plan for the work assigned
  5. Investigation of the problems
  6. System Analysis
    - 6.1 Feasibility study
    - 6.2 Context Diagram
    - 6.3 Data Flow Diagram
  7. System Design
    - 7.1 ER and implementation
    - 7.2 User interface
  8. Program Specification
  9. Algorithms
  10. Flowchart or Decision tree of Decision Table or Structure English
  11. Program coding
  12. Input test Data
  13. Program Testing
  14. Output/Reports
  15. Computer (software and Hardware) requirement to run this program
  16. Software Installation and operation procedures



17. Comments on the Assignment project if any (How did he/she find it? Time provided and resources along with teacher's guidance at required of the student or not. What improvement you would make if certain asked thing provided to you?)
18. Conclusion and recommendation
19. Users Manual

### **Special Attention**

Each student should be given ample opportunity to use computer system for the assigned project work. Sample format of project work could be given to the students before assigning the work.

The computer system must have required necessary software packages and program installed in order to accomplish the tasks assigned to them. Teacher could guide students during the development work assign to students. **Generally, individual project is more preferable** because he/she can learn more on project but project work can be done in group (maximum of 5 persons in each group).

