PG- COMPUTER INSTRUCTOR

SYLLABUS

COMPUTER SYSTEMS ARCHITECTURE

1. **THE COMPUTER SYSTEM**   Marks: 10

   System buses: Computer Components, Computer function, Interconnection Structures.

   Internal Memory: Computer Memory System Overview, Cache Memory.

   Input/ Output: External Devices, Direct Memory Access, The External Interface.

   Operating System Overview.

2. **THE CENTRAL PROCESSING UNIT**

   Computer Arithmetic: The Arithmetic and Logic Unit (ALU), Floating-Point Arithmetic.

   Instruction Sets: Types of Operands, Types of Operation, Register Organization, The Instruction Cycle.

   ### OPERATING SYSTEMS   Marks: 10

   Introduction: System software, OS strategies; multiprogramming, batch.

   Operating System Organization: basic OS function, kernels, device drivers.

   Device Management: buffering.

   Process Management: resource abstraction, process hierarchy.

   Scheduling: Strategy selection.

   Synchronization Principles: deadlock, semaphores, multiprocessors.

   Deadlocks: hold and wait, Banker's Algorithm, consumable resources.

   Memory Management: memory allocation strategies, variable partition.

   Protection and Security: internal access authorization.

   ### DIGITAL ELECTRONICS   Marks: 10

   Fundamental Concepts: NAND, NOR and Exclusive-OR operation, Boolean Algebra.

   Number system and Codes: Primary, Octal, Hexadecimal, Signed Numbers Codes.

   Combinational Logic Design: K-map representation of logical functions and simplification using K-map of 4 and 5 variables.

   Multiplexers, Decoders.

   Flip-Flops: Edge triggered flip flop.

DATA STRUCTURES   Marks: 15

Abstract data types and objects, graphical user interfaces; language support and OOP: Inheritance, classes and subclasses, header files, overloading.

Programming with Data structures: Stacks, queues, lists, trees and balanced binary trees, algorithms for searching and sorting and open office.

PROGRAMMING IN C++   Marks: 20

1. Object Oriented Programming: Data hiding, Data encapsulation, Class and Object, Abstract class and Concrete class, Polymorphism (Implementation of polymorphism using Function overloading as an example in C++); Inheritance, Advantages of Object Oriented Programming over earlier programming methodologies.

2. Implementation of Object Oriented Programming concepts in C++: Members of a class-Data Members AND Member Functions (methods), inside class definition and outside class definition using scope resolution operator (::) Objects as function arguments-pass by value and pass by reference;

Constructor and Destructor:

Constructor: Declaration and Definition of a constructor, Default Constructor, Overloaded Constructors

Destructor: Declaration and definition of destructor;

Inheritance (Extending Class): Concept of Inheritance, Base Class, Derived Class, Defining derived classes, Multilevel inheritance and Multiple inheritance,

Data File Handling:

Reading and Manipulation of text from an already existing text File (accessing sequentially);

3. Pointers:

Declaration and Initialization of Pointers: Dynamic memory allocation/ deallocation operators: new, delete; Pointers and Arrays: Array of Pointers, Function returning a pointer. Deference operator: *,->; self referential structures, Python, PHP;

RELATIONAL DATABASE MANAGEMENT SYSTEM   Marks: 10

1. Database Management System

Introduction to database concepts: Relation/ Table, Data, Concept of String Candidate key, Alternate key, Primary Key, Foreign Keys; Data Normalization-first, second, third, BCNF normal form;

Examples of Commercially available Database Management System's (Back-End) –MySQL,

Examples of Front End Software's Visual C++

2. RDBMS Tools: Oracle

Classification of SQL Statements: DML (SELECT, INSERT, UPDATE, DELETE),

SQL SELECT Statement: SQL SELECT statement, Selecting All the Columns, Selecting Specific Column, Column Heading Default,

SELECT Statement Continued: Limiting Rows during selection (using WHERE clause), Logical Operators, Use of Logical

Operators (AND/OR/NOT Operators), Logical Operator Precedence, ORDER BY Clause, Sorting in Ascending/ Descending Order,

Functions: SQL Functions, Types of SQL Function (Single Row/ Multiple Row), Character Functions UPPER ()] TRIM (), SUBSTR (), (ROUND (), TRUNC (), MOD()), Working with Dates [LAST_DAY(), MONTHS_BETWEEN(), ROUND(), Implicit and Explicit Conversion,

Grouping Records: Types of group functions [MAX (), MIN (), AVG (), SUM (), COUNT ()], using AVG and SUM Functions, Group By Clause, Grouping By More than One Column, Having Clause.

Sub Queries: Guidelines for Using Sub Queries, Types of Sub-Queries (Single Row and Multiple Row)

Database Objects: DDL (Data Definition Language), , Creating Synonyms, Querying a View, Modifying a view.

Including Constraints: UNIQUE KEY, PRIMARY KEY, FOREIGN KEY, FOREIGN KEY

Creation of a Table/ Relation: CREATE TABLE Statement, Creating a Table by Using a Sub-Query;

Managing Existing Tables and other Database Objects: The ALTER TABLE Statement, Adding a New Column in a Table, Dropping Tables;

BUSINESS COMPUTING　　　　　　　　　　　　　　Marks: 15

Integration of User Interface and Database;

More application areas of Databases:

Inventory control, Financial Accounting, Fees Management System, Result Analysis System, Admission Management System, Income Tax Management System;

\\ Advance Program Development Methodology: System Development

Life Cycle, Data Models (Entity Relationship Model), Attributes (Single, Composite and Multi- Valued), Relationship (One-to-One, One-to-Many and Many-to-Many SQL Statements,

Data Dictionary, Data Warehousing, Data Mining,

WEB DEVELOPMENT　　　　　　　　　　　　　　Marks: 10

HTML/ DHTML

Introduction, Objectives, Introduction to Universal Resource Identifier (URI)

Basic Tags of HTML: HTML, HEAD, TITLE, BODY, Ordered List-OL (L1, Type-1, I, A, a; START, VALUE), Unordered List-UL (Bullet Type- Disc, Circle, Square, DL, DT, DD), Web Page Authoring Using HTML

Tables: Creating Tables, Border, WIDTH, CAPTION, ALIGN,

Frames: Frameborder, height and width,

Forms: Definition, MS-Access or Oracle,

Form Tags: FORM, METHOD, Document Object Model

1. Active Server Pages (ASP)

Active Server Pages (ASP): Concept of ASP, features of ASP,

Variables: Explicit and Implicit Declaration;

Functions:

String Manipulation Functions: Ucase (), Lcase (), Len (), Left (), Right (), Mid (), Ltrim (), InStr()

Time & Date Functions: Date (), Day(), Hour (), Left (), Len (), Minute (), Month (), Monthname (), Now ();

Arrays: Declaration and use of 1 dimensional and 2 dimensional arrays;

Procedures and Functions, Passing parameters/ arguments;

Connecting with Databases: Creation of DSN, using OLEDB.

WEB SCRIPTING　　　　　　　　　　　　　　Marks: 10

1. Java Script

Event handling, Adding Java Script in an HTML Page

MULTIMEDIA AND AUTHORING TOOLS

Image Formats

TIFF, BMP, JPG/ JPEG, GIF, IC, PDF, PSD:

Image Scanning with the help of scanner: Setting up Resolution, Size, File formats of images; image preview

Significance of PDF-creation, modification; Animation, Morphing and Applications

Graphic Tools: Image Editing Software (Photoshop/ CorelDraw)

Image Handling: Cropping an image, adjusting image size, saving an image;

Layers: Adding layers, dragging and pasting selections on to layers, moving and copying layers, duplicating layers, deleting layers, merging layers. Opacity.

Concept of Multimedia: Picture/ Graphics, Audio, Video;

Sound: Recording Sound using Sound Recorder (Capture), Sound editing, Effect enhancement;

Voice Recognition Software Philips/ Dragon, MIDI Player, Sound Recorder.

Sound Quality: Radio Quality,

1. Movie File Formats: AVI, MPEG.

   Movie Frames: Concept of Frame, Frame Buffer,;

2. Multimedia Authoring Using Macromedia Flash

   Making of Simple Flash Movie,

COMMUNICATION AND NETWORK CONCEPTS   Marks: 20

Evolution of Networking: Internet;

Data Communication terminologies: Bandwidth (Hz, KHz, MHz) and Data transfer rate (bps, kbps, Mbps, Gbps, Tbps);

Network devices: Modem, Ethernet Card, Hub, Switch, Router,

Different Topologies- Bus, Tree; Concepts of LAN, WAN, MAN;

Protocol: TCP/IP, Internet, Wireless/ Mobile Communication, GSM, Electronic Mail, Chat, Video Conferencing;

Network Security Concepts: Cyber Law, Hackers and Crackers;

WebPages; Hyper TEXT markup Language (HTML), Hyper Text Transfer Protocol (HTTP); Website, Web Browser, Web Servers.