GUIDELINES FOR CSB CANDIDATES : PGT COMPUTER SCIENCE

1.   **Aim.**   To test the level of knowledge of the candidate and assess his/her suitability for employment as PGT Computer Science to teach with proficiency in class XI & XII in an **English** medium **Private** school system following the syllabus prescribed by **CBSE**. The Proficiency is primarily required in C++/JAVA/PITHON.

2.   **Knowledge Level.**   Though PGT Computer Science has to teach class XI & XII, the knowledge level will be beyond class XII so that the teacher can help and guide learners to think critically "out of TEXTBOOK" questions. Also the teacher is to assist and help the Management/Principal in developing IT infrastructure in the school.

3.   **Understanding.**   Candidate should have very well versed with the Computer Fundamentals, programming concepts especially in C++, JAWA and PITHON. Also s/he should have good understanding of Net Technologies, Database Management System, RDBMS, SQL etc. S/he should be able to analyse and comprehend a question asked in the paper, be in a position to choose the correct/relevant answer from the options given in English in the limited time available for the Ques Paper.

4.   **Awareness.**   Candidates are also required to be very well verse with the latest developments in the field of teaching and learning besides Computer Sc, IT, ICT in Education etc.

5.   **Format of the Paper.**   The paper will consist of 90 questions based on the following format:-

   (a)   Knowledge Based Ques   - 10%
   (b)   Understanding Based Ques   - 20%
   (c)   Application Based Ques   - 30%
   (d)   Skill Based Ques   - 40%

6.   The broad breakdown of question paper will be as under:-

BREAKDOWN OF QUESTIONS

(a)	Computer Fundamentals	:	8 Marks
(b)	Programming in C++, Python Data Structure and Programming Methodology	:	20 Marks
(c)	Databases Management System and SQL	:	10 Marks
(d)	Boolean Algebra & Digital Electronics	:	5 Marks
(e)	Networking, OSS and Communication Technologies	:	10 Marks
(f)	Programming in JAVA and IT application	:	20 Marks
(g)	Web Development, HTML/XML/ Web Scripting	:	12 Marks
(h)	Multimedia & Authoring Tools	:	5 Marks

   TOTAL   90 Marks/Questions

7. **Detailed Syllabus.** Detailed Syllabus is given as under:-

COMPUTER FUNDAMENTALS   - 8 Marks

Evolution of computers; Basics of computer system and its operation: Functional Components and their inter-connections; concept of Booting.

Software Concepts: Types of Software - System Software, Utility Software and Application Software;
System Software: Operating System, Compiler, Interpreter and Assembler; **Utility Software:** Anti Virus, File Management tools, Compression tools and Disk Management tools **Application software:** Office Tools - Word Processor, Presentation Tool, Spreadsheet Package, Database Management System; Domain specific tools - School Management System, Inventory Management System, Payroll System, Financial Accounting, Hotel Management, Reservation System and Weather Forecasting System

Number System: Binary, Octal, Decimal, Hexadecimal and conversion amongst these number systems.

Internal Storage encoding of Characters: ASCII, ISCII (Indian scripts Standard Code for Information Interchange), and UNICODE (for multilingual computing)

Microprocessor: Basic concepts, Clock speed (MHz, GHz), 16 bit, 32 bit, 64 bit processors, 128 bit processors; Types - CISC Processores (Complex Instruction set computing), RISC Processors (Reduced Instruction set computing), and EPIC (Explicitly parallel Instruction computing).

Memory Concepts: Units: Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, Peta Byte, Exa Byte, Zetta Byte, Yotta Byte **Primary Memory:** Cache, RAM, ROM **Secondary Memory:** Fixed and Removable Storage - Hard Disk Drive, CD/DVD Drive, Pen Drive, Blue Ray Disk

Input Output Ports/Connections: Serial, Parallel and Universal Serial Bus, PS-2 port, Infrared port, Bluetooth, Firewire.

PROGRAMMING IN C++   - 20 Marks

Getting Started :

C++ character set, C++ Tokens, Structure of a C++ Program (include files, main function), Header files - iostream.h, iomanip.h, **cout, cin;** Use of I/O operators (<< and >>), Use of endl and setw (), Cascading of I/O operators, Error Messages; Use of editor, basic commands of editor, compilation, linking and execution.

Data Types, Variables and Constants: Concept of Data types; Built-in Data types: **char, int, float** and **double;** Constants: Integer Constants, Character constants - \n, \t, \b), Floating Point Constants, String Constants; Access modifier: **const;** Variables of built-in data types, Declaration/Initialisation of variables, Assignment statement; Type modifier: **signed, unsigned, long**

Operator and Expressions: Operators: Arithmetic operators (-,+,*,/,%), Unary operator (-), Increment (++) and Decrement (--) Operators, Relation operator (>,>=,<,<=,= =,!=), Logical operators (!, &&,||), Conditional operator; Precedence of Operators; Automatic type conversion in expressions, Type casting; C++ shorthands (+=, -=, *=, /=, %=)

Flow of control: Conditional statements: **if-else**, Nested **if, switch..case..default**, use of conditional operator, Nested **switch..case, break** statement (to be used in **switch..case only**); Loops: **while, do - while , for** and
Nested loops

Inbuilt Functions; Header file Categorization Header Function File; Standard input/output functions stdio.h; Character Functions ctype.h; String Functions string.h ; Mathematical Functions math.h Other Functions stdlib.h randomize ( ), random ( ), User Defined Functions: Introduction to user-defined function and its requirements.

Defining a function; function prototype, Invoking/calling a function, passing arguments to function, specifying argument data types, default argument, constant argument, call by value, call by reference, returning values from a function, calling functions with arrays, scope rules of functions and variables local and global variables. Relating the Parameters and return type concepts in built-in functions.

Structured Data Type:

Arrays: Introductory and advantages. One Dimensional Array : Declaration/initialisation of One-dimensional array, Inputting array elements, Accessing array elements, Manipulation of Array elements, Declaration/Initialization of a String, string manipulations; **Two-dimensional Array** Declaration/ initialisation of a two-dimensional array, inputting array elements Accessing array elements, Manipulation of Array elements

User-defined Data Types: Introduction ;**Structure** Defining a Structure (Keyword Structure), Declaring structure variables, Accessing structure elements, Passing structure to Functions as value and reference argument/parameter, Function returning structure, Array of structures, passing an array of structure as an argument/ a parameter to a function; using **typedef** keyword using **#define** directive.

Object Oriented Programming:

Concept of Object Oriented Programming - Data hiding, Data encapsulation, Class and Object, Abstract class and Concrete class, Polymorphism; Inheritance, Advantages of Object Oriented Programming over earlier programming methodologies,

Implementation of Object Oriented Programming concepts in C++:

Definition of a class, Members of a class - Data Members and Member Functions (methods), Using Private and Public visibility modes, default visibility mode (private); Member function definition: inside class definition and outside class definition using scope resolution operator (::); Declaration of objects as instances of a class; accessing members from object(s), Objects as function arguments - pass by value and pass by reference;

Constructor and Destructor: Destructor: Special Characteristics, Declaration and definition of destructor;

Inheritance (Extending Classes):

Data File Handling: Text File : Basic file operations on text file: Binary File: Creation of file, Writing data into file, Searching for required data from file, Appending data to a file, Insertion of data in sorted file, Deletion of data from file, Modification of data in a file; Header file: fstream.h; ifstream, ofstream, fstream classes; Opening a text file in in, out, and app modes; Using cascading operators (>> <<)for writing text to the file and reading text from the file; open(), get(), put(), getline() and close() functions; Detecting end-of-file (with or without using eof() function); Opening a binary file using **in, out,** and **app** modes; **open(), read(), write()** and close() functions; Detecting end-of-file (with or without using **eof()** function); **tellg(), tellp(), seekg(), seekp()** functions.

Pointers: Introduction to Printer, Declaration and Initialization of Pointers; Dynamic memory allocation/deallocation operators: **new, delete;** Pointers and Arrays: Array of Pointers, Pointer to an array (1 dimensional array), Function returning a pointer, Reference variables and use of alias; Function call by reference. Pointer to structures: De-reference/Deference operator: *, ->; self referencial structures;

PROGRAMMING METHODOLOGY

General Concepts; Modular approach; Clarity and Simplicity of Expressions, Use of proper Names for identifiers, Comments, Indentation; Documentation and Program Maintenance; Running and Debugging programs, Syntax Errors, Run-Time Errors, Logical Errors **Problem Solving Methodologies:** Understanding of the problem, Identifying minimum number of inputs required for output, Writing code to optimizing execution time and memory storage, step by step solution for the problem, breaking down solution into simple steps, Identification of arithmetic and logical operations required for solution, Control Structure: Conditional control and looping (finite and infinite)

DATA STRUCTURES

Introduction to data structure, primitive and non-primitive data structure, linear and non-linear structure, static and dynamic data structure.

Arrays: One and two Dimensional arrays: Sequential allocation and address calculation; One dimensional array: Traversal, Searching (Linear, Binary Search), Insertion of an element in an array, deletion of an

element from an array, Sorting (Insertion, Selection) Two-dimensional arrays: Traversal, Finding sum/difference of two NxM arrays containing numeric values, Interchanging Row and Column elements in a two dimensional array;

Stack (Array and Linked implementation of Stack): Introduction to stock (LIFO - Last in First Out Operations) Operations on Stack (PUSH and POP) and its Implementation in C++, Converting expressions from

INFIX to POSTFIX notation and evaluation of Postfix expression;

Queue: (Circular Array and Linked Implementation): Introduction to Queue (FIFO - First in First out operations) Operations on Queue (Insert and Delete) and its Implementation in C++.

DATABASES MANAGEMENT SYSTEM AND SQL   - 10 Marks

Database Concepts: Introduction to data base concepts and its need. **Relational data model:** Concept of domain, tuple, relation, key, primary key, alternate key, candidate key; **Relational algebra:** Selection, Projection, Union and Cartesian product;

Structured Query Language: General Concepts: Advantages of using SQL, Data Definition Language and Data Manipulation Language; **Data types:** NUMBER/DECIMAL, CHARACTER/VARCHAR/VARCHAR2, DATE; **SQL commands:** CREATE TABLE, DROP TABLE, ALTER TABLE, UPDATE...SET..., INSERT, DELETE; SELECT, DISTINCT, FROM, WHERE, IN, BETWEEN, GROUP BY, HAVING, ORDER BY; SQL functions: SUM, AVG, COUNT, MAX and MIN; Obtaining results (SELECT query) from 2 tables using equi-join, Cartesian Product and Union Note: Implementation of the above mentioned commands could be done on any SQL supported software on one or two tables.

Functions in MySQL: String Functions : CHAR(), CONCAT(),INSTR(), LCASE(), LEFT(), LOWER(), LENGTH(), LTRIM(), MID(), RIGHT(), RTRIM(), SUBSTR(), TRIM(), UCASE(), UPPER(). Mathematical Functions : POWER(), ROUND(), TRUNCATE(). Date and Time Functions : CURDATE() , DATE(), MONTH(), YEAR(), DAY DAYOFMONTH(), DAYOFWEEK(), DAYOFYEAR(), NOW(), SYSDATE().

Working with number Character, Date, and NULL values. • Using Comparison Operators : =, <, >, <=, >=, <>, BETWEEN, IN, LIKE (%,_), Using Logical Operators - AND, OR, NOT, Operator Precedence. • ORDER BY Clause: Sorting in Ascending/Descending Order, Sorting using Column alias, Sorting On Multiple Columns. Manipulating Data of a Table/Relation: Update command to change existing data of a Table; Delete command for removing row(s) from a Table. Restructuring a table: ALTER TABLE for adding new column(s), and deleting columns.

Displaying table data: SELECT command for Selecting all the Columns, Selecting Specific Column, Using Arithmetic Operators, Operator Precedence, Defining and using column alias, Eliminating duplicate values from display (DISTINCT Keyword), Limiting rows during selection (using WHERE clause), Working with number Character, Date, and NULL values. • Using Comparison Operators : =, <, >, <=, >=, <>, BETWEEN, IN, LIKE (%,_), Using Logical Operators - AND, OR, NOT, Operator Precedence. • ORDER BY Clause: Sorting in Ascending/Descending Order, Sorting using Column alias, Sorting On Multiple Columns. Manipulating Data of a Table/Relation: Update command to change existing data of a Table; Delete command for removing row(s) from a Table.Restructuring a table: ALTER TABLE for adding new column(s), and deleting columns. **Grouping Records:** GROUP BY, Group functions - MAX(), MIN(), AVG(), SUM(), COUNT(); using COUNT(*), DISTINCT clause with COUNT, Group Functions and Null Values, **Displaying Data From Multiple Tables:** Cartesian product, Union, concept of Foreign Key, Equi- Join Creating a Table with PRIMARY KEY and NOT NULL constraints, Viewing Constraints, Viewing the Columns associated with constraints using DESC Command; ALTER TABLE for deleting a column, modifying data type of a column, adding constraints, enabling constraints, and dropping constraints.

BOOLEAN ALGEBRA   - 5 Marks

Role of Logical Operations in Computing. Binary-valued Quantities, Logical Variable, Logical Constant and Logical Operators: AND, OR, NOT; Truth Tables; Closure Property, Commutative Law, Associative Law,

Identity law, Inverse law, Principle of Duality, Idem potent Law, Distributive Law, Absorption Law, Involution law, DeMorgan's Law and their applications; Obtaining Sum of Product (SOP) and Product of Sum (POS) form from the Truth Table, Reducing Boolean Expression (SOP and POS) to its minimal form, Use of Karnaugh Map for minimization of Boolean expressions (up to 4 variables); **Application of Computing Logic:** Building up logic circuits using basic Logic Gates (NOT, AND, OR, NAND, NOT) Use of Boolean operators (NOT, AND, OR) in SQL SELECT statements Use of Boolean operators (AND, OR) in search engine queries.

NETWORKING AND OPEN SOURCE SOFTWARE COMMUNICATION TECHNOLOGIES
- 10 Marks

Evolution of Networking: ARPANET, www, Internet, Interspace Different ways of sending data across the network with reference to switching techniques (Circuit, Message and Packet switching)
Data Communication terminologies: Concept of Channel and Data transfer rate (bps, kbps, Mbps, Gbps, Tbps) **Transmission media:** Twisted pair cable, coaxial cable, optical fiber, infrared, radio link, microwave link and satellite link
Network devices: Modem RJ11and RJ45 connectors, Ethernet Card, Hub, Switch, Gateway **Network Topologies and types:** Bus, Star, Tree; PAN, LAN, WAN, MAN **Network Protocol:** TCP/IP, File Transfer Protocol (FTP), PPP, Remote Login (Telnet), Internet Wireless/Mobile Communication protocol such as GSM, CDMA, GPRS, WLL, Mobile Telecommunication Technologies : 1G, 2G, 3G and 4G; Electronic mail protocols such as SMTP, POP3 Protocols for Chat and Video Conferencing VOIP Wireless protocols such as Wi-Fi and WiMax **Network Security Concepts:** Threats and prevention from Viruses, Worms, Trojan horse, Spams Use of Cookies, Protection using Firewall; India IT Act, Cyber Law, Cyber Crimes, IPR issues, Hacking.
WebServices: WWW, Hyper Text Markup Language (HTML), eXtensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; Protocol Address; Website, Web browser, Web Servers; Web Hosting, Web Scripting - Client side (VB Script, Java Script, PHP) and Server side
(ASP, JSP, PHP), Web 2.0 (for social networking)
Open Standards Introduction to open standards and its advantage in development of inter-operable environment. **Open Source Concepts** Proprietory and Open Source Software, Freeware, Shareware, FLOSS/FOSS, GNU,FSF, OSI, W3C
Cloud Computing Characteristics, layers-client, Application, platform and infrastructure, Deployment models-Private cloud, Public cloud, Community cloud and hybrid cloud, Issues- Privacy, Compliance, Security, Sustainability and abuse.

PROGRAMMING USING JAVA   - 20 Marks
Getting started with • Introduction, Rapid Application Development using IDE (Integrated Development Environment); Familiarization of IDE using basic Interface components-Label, Text Field, Text Area, Button, Checkbox, Radio Button.• Developing General Application - Getting Familiar with Java User Interface Swing components - Frame, Option Pane, Label, Text Field, Password Field, Text Area, Button, Check Box, Radio Button, Combo Box, List, and their respective methods and properties:
Programming Fundamentals
Data Types: Concept of data types; Built-in data types: byte, short, int, long, float, double, char, String, Boolean
Variables: Need to use variable, Declaring Variables, Variable Naming Conventions, Assigning values to Variable(s); **Integer object method:** Parse Int **Double object method:** parse double, parse float **Control Structures:** Decision Structures: if, if-else, switch; Looping Structures: while, do-while, for;
Programming Guidelines: Problem Solving Methodology : Understanding of the problem, Identifying minimum number of inputs required for output, breaking down problem into simple logical steps. Modular approach; Stylistic Guidelines: Clarity and Simplicity of Expressions, Names, Comments, Indentation;

Running and debugging programs: Syntax Errors, Run-Time Errors, Logical Errors. Basic concept of Access specifier for classes, Members and methods Basic concept of Inheritance. Commonly used libraries: String class and methods: toString(), concat(), length(), toLowerCase(), to UpperCase(), trim(), substring() Math class methods: pow(), round() Accessing MySQL database using ODBC/JDBC to connect with database. Web application development: URL, Web Server, Communicating with the web server, concept of Client and Server Side. HTML based web pages covering basic tags - HTML, TITLE, BODY, H1..H6, Paragraph (P), Line Break (BR), Section Separator (HR), FONT, TABLE, LIST (UL, OL), IMG, FORM; Creating and accessing static pages using HTML and introduction to XML

IT APPLICATIONS

e-Governance : Definition, Benefits to citizens, e-Governance websites and their salient features; Societal impacts; e-Governance challenges. e-Business : Definition, Benefits to customers and business, e-Business websites and their salient features; Societal impacts; e-Business challenges. e-Learning : Definition; Benefits to students (Learners), teachers (Trainers) and school (Institution) Management; e-Learning websites and their salient features Societal impacts; e-Business Challenges. In each of the above domains, identify at least two real-life problems, list the input(s) required for the expected output(s), and describe the problem solving approach. **Front-end Interface -** Introduction; content and features; identifying and using appropriate component (Text Box, Radio Button, CheckBox, List etc. as learnt in Unit-2 (Programming) for data entry, validation and display; **Back-end Database -** Introduction and its purpose; exploring the requirement of tables and their essential attributes; **Front-End and Database Connectivity -** Introduction, requirement and benefits
Demonstration and development of appropriate Front-end interface and Back-end Database for e-Governance, e-Business and e-Learning applications **Impact of ICT on Society :** Social and Economics benefits and Infomania.

WEB PAGE DEVELOPMENT   - 12 Marks
WWW, Domain Names, URL, IP Address, Website, Web browser, Web Server, Web Hosting;
HTML Introduction, Content creation, SGML, HTML, creating HTML document using a text editor, Saving HTML document, Editing a HTML document, Viewing HTML documents in a Web Browser, Switching between text editor and web browser windows to view changes made;
Web Page Authoring Using HTML: Basic Concepts:
Concept of tags and attributes, Difference between Container tag and Empty tag;
Structural Tags of HTML: <HTML>, <HEAD>, <TITLE>, <BODY>;
Attributes of <BODY> (BGCOLOR, BACKGROUND, LINK, ALINK, VLINK)
Inserting Breaks: Line break <BR>, Page break <P>; Attributes of <P> (ALIGN), Section break <HR>;
Attributes of <HR> (WIDTH, ALIGN, SIZE, NOSHADE, COLOR)
Formatting Tags of HTML: <SMALL>, <BIG>, <B>, <I>, <U>, <EM>, <BLOCKQUOTE>, <PRE>, <SUB>, <SUP>, <STRIKE>, <ADDRESS>, Adding Comments in HTML (<!-- -->), Heading tag (<H1> to <H6>); Attributes of Heading tag (ALIGN), <FONT> tag; Attributes of <FONT> (SIZE, COLOR, FACE),
Creating Lists: Ordered Lists: <OL>,<LI>; Attributes of <OL>(TYPE - 1, I, A, a; START, VALUE); Unordered Lists : <UL>, <LI> (TYPE- disc, circle, square) Definition List : <DL>, <DT>, <DD>
Creating Links: Internal linking using <A NAME> and <A HREF>; External linking using <A HREF>; E-Mail linking using <A HREF>; Concept of URL; Absolute Links & Relative Links
Inserting Images: Inserting inline images using <IMG>; Attributes of <IMG> (SRC, ALIGN, WIDTH, HEIGHT, ALT, BORDER);
Adding Music: Adding music using <A HREF> and <EMBED>; Attributes of <EMBED> (SRC, ALIGN, WIDTH, HEIGHT, LOOP, AUTOSTART, HIDDEN);
Creating Tables: Creating Table using <TABLE>; Attributes of <TABLE> (BORDER, BGCOLOR, BACKGROUND, ALIGN, CELLSPACING, CELLPADDING, WIDTH, HEIGHT) Creating rows and columns in a table using <TH>,

<TR>, <TD>; Attributes of <TH>, <TR>, <TD> (ALIGN, VALIGN, COLSPAN, ROWSPAN); Adding headings for a table using <CAPTION>; Attribute of <CAPTION>(ALIGN)

Creating Frames: Dividing the window into two or more frames using <FRAME> and <FRAMESET>, Use of percentage dimensions and relative dimensions while dividing the window; use of <NOFRAMES>; Attributes of <FRAMESET> (ROWS, COLS, BORDER, FRAMEBORDER); Attributes of <FRAME> (SRC, NAME, FRAMEBORDER, HEIGHT, WIDTH, MARGINHEIGHT, MARGINWIDTH, SCROLLING, NORESIZE>

Forms: Processing of data collection through a Form - written to a file, submitted to a database or emailed to
someone; Creating Forms using <FORM>, Attributes of <FORM> (NAME, ACTION, METHOD)
Creating Form Interface elements - single line text box, password box, file selection box, hidden box, checkbox, radio button, button, submit button, reset button using the <INPUT>; Attributes of <INPUT> applicable with different interface elements (NAME, SIZE, VALUE, ALIGN, MAXLENGTH, CHECKED, TYPE); multiline text area using <TEXTAREA>; Attributes of <TEXTAREA> (NAME, ROWS, COLS, WRAP); dropdown list or scroll list using <SELECT> and <OPTION>; Attributes of <SELECT> (NAME, SIZE, MULTIPLE/SINGLE)

Document Object Model Concept and Importance of Document Object Model, Dynamic HTML documents;
Cascading Style Sheets Introduction to Cascading Style Sheet (CSS): Creating inline, embedded and external cascading style sheets using <STYLE>, <DIV>, <SPAN> and <LINK>; Attribute of <DIV> and <SPAN> (STYLE); Attributes of <LINK> (REL, TYPE, HREF);
Font Properties: FONT-FAMILY, FONT-STYLE, FONT-SIZE, FONT-VARIANT, FONT-WEIGHT and COLOR **Text Properties:** WORD-SPACING, LETTER-SPACING, TEXT-DECORATION, VERTICAL-ALIGN, TEXTTRANSFORM; TEXT-ALIGN, TEXT-INDENT, LINE-HEIGHT **Background Properties:** BACKGROUND-COLOR, BACKGROUND-IMAGE, BACKGROUND-REPEAT;
Margin Properties: MARGINS (all values); **Padding Properties:** PADDING (all values); **Border Properties:** BORDER (all values); **Positioning:** Absolute and Relative; **Additional Features:** Assigning Classes; **XML-eXtensible Markup Language:** Introduction, Features, Advantages; **Structure of XML:** Logical Structure, Physical Structure; **XML Markup:** Element Markup (example: <foot>Hello</foot>), Attribute Markup (example: <!element.name property= "value">) ; **Naming Rules:** Naming rules for elements, attributes and descriptors;
Components of XML: Tags, Elements, Root element, Attributes, Entities; Comments in XML; **Developing DTD:** Element Declaration in a DTD: <!ELEMENT elementname (content-type)> Entity Declarations, Declaring Empty Elements, Container Elements, Unrestricted Elements, Attribute Declarations
Element Content Model Element Occurrence Indicators: ? ,*,+ ; Character Content: PCDATA (Parseable Character data) <!ELEMENT text(#PCDATA)> Well Formed XML Documents, Valid XML Documents
Document Type Declaration (DTD) - Internal and External DTD Validating an XML document using a DTD using Parsers; Developing a DTD, Developing a DTD from XML Code, either automatically or manually; Viewing XML in Internet Explorer, Viewing XML using the XML Data Source Object;

Web Scripting; VBScript Introduction to client side scripting using <SCRIPT> tag,

VBScript Variables: Declaring variable, Naming restrictions, Assigning value to variables, Scalar variables and1-D Array, Importance of Variant Data type;VBScript Constants, **VBScript Operators:** VBScript Operators and Operator precedence; Arithmetic Operators: +, - (Unary and Binary), *, /, \ (integer division), MOD, ^ Comparison Operators: <, >, <=, >=, <>, = Logical Operators: AND, OR, NOT ; String Operators: & and + (for concatenation) **Control Structures in VBScript: Conditional statements:** If..Then.. Else...End if, Select Case; **Loops:** Entry controlled and Exit controlled loops; Do..Loop, While.. Wend, For..Next, For Each..Next; **Inbuilt Functions of VBScript General Functions:** MsgBox function, Arguments of MsgBox function (Prompt, Buttons, Title), Return values of MsgBox function; InputBox function, Arguments of InputBox function (Prompt, Title, Default, Xpos, Ypos), Return values of InputBox function;
Conversion Functions: Abs(), CBool(), CByte(), CInt(), CStr(), CSng(), CLng(), CDate() ; **String Manipulation**

Functions: Ucase(), Lcase(), Len(), Left(), Right(), Mid(), LTrim(), RTrim(), Trim(), InStr() ; **Time & Date Functions:** Date(), Day(), Month(), Hour(), Minute(), Monthname(), Now()

VBScript Procedures and Functions(User Defined): Sub procedures, Functions, passing parameters/arguments; **Creating Dynamic Interface using VBScript** Using VBScript with HTML form controls **Installation and Managing WEB-Server:** Internet Information Server (IIS) / Personal Web Server (PWS).

Active Server Pages (ASP): Concept of ASP, features of ASP, other equivalent tools - JSP, PHP;

Constants: String and Numeric; **Data types:** Integer, Floating Point (Single, Double), String, Date, Boolean, Currency, Variant, Object; **Variables:** Explicit and Implicit Declaration of variables **Operators: Arithmetic:**+, - (Unary and Binary), *, /, \(integer division) mod, ^; **Comparison:** <, >, <=, >=, <>, =; **Logical:** AND, OR, NOT, XOR, EQV, IMP; **String Operator:** & or + (for Concatenation); **Functions:** Conversion functions: Abs(), CBool(), CByte(), CInt(), CStr(), CSng(), CLng(), CDate(); String Manipulation Functions: UCase(), LCase(), Len(), Left(), Right(), Mid(), LTrim(), InStr(), RTrim(), Trim(); **Time & Date Functions:** Date(), Day(), Hour(), Minute(), Month(), Monthname(), Now(); **Arrays:** Declaration and use of 1 dimensional arrays; **Controls:** If..Then, If..Then..Else..End If, If..Then, Else If..Then..Else..End If Select..Case..End Select, For..Next, For Each.. Next, Do While..Loop, Do.. Loop While, Do Until.. Loop, Do..Loop Until; **Procedures and Functions:** Passing parameters/arguments; **Concept of object model structure** (client to server and server to client);**Objects:** Properties, Methods, Events, Setting Object properties, Retrieving Object properties, calling objects/methods; **Types of Objects:** Response, Request, Application, Session, Server, ASPError; **Response Object:** Write Method, AddHeader, AppendToLog, BinaryWrite, Using Shortcuts <%=value/expr%>, Controlling information: Buffer, Flush Clear, End; **Request Object:** Request Object Collection: QueryString, Form, ServerVariables, Cookies, ClientCertificate; **Server Variables:** HTTP_User_Agent, REMOTE_ADDER, REMOTE_HOST, SERVER_NAME; **Application :** Contents, Lock, Unlock, Remove, RemoveAll;

ASP Components:

AD Rotator, Content Rotator, Counter, Page Counter, Permission Checker;

Text Files:

Open, Read and display content from a text file;

Working on Database:

Connecting with Databases: Creation of DSN, using OLE DB

Inserting, Retrieving, Modifying/Updation of records from Tables in Databases using server objects (ADODB.Connection, ADODB.Recordset);

MULTIMEDIA AND AUTHORING TOOLS   - 5 Marks

Concept of Multimedia:

Picture/Graphics, Audio, Video; Digital Images and Digital Image Representation, Animation, Morphing

Image Formats: TIFF, BMP, JPG/JPEG, GIF, PDF, PSD;

Applications:

Poster Design, Still pictues, colored layout, Designing of - Books, magazines brochures, children's literature, narrative text handling, scripts in Indian Languages, picture books, comics, illustrations with photographs, scientific illustrations, conceptual illustrations, handling of assignment for the market;

Image Scanning with the help of scanner: Setting up Resolution, Size, File formats of images, Bitonal, Grey Scale and color options, preview the image

Graphic Tools: Image Editing Software (Photoshop / Coreldraw), GIMP

Basic Concepts of Image Creation: Introduction, Creating, Opening and saving files, Interface elements of the tool: Menus, Toolbox, Color control icons, Mode control icons, Window controls icons;

Image Handling: Cropping, Adjusting Image Size, Adjusting the Size of the Work Canvas, Rotating selections, Scaling an object

Operations on Layers: Adding new layers, Dragging and Pasting selected objects on to layers, Dragging layers between files, Viewing, Hiding, Editing, Moving, Copying, Duplicating, Deleting, Merging layers, Preserving layers, Using Adjustment layers;

Channels and Masks: Channel palette, Showing and Hiding channels, Splitting channels in to separate image, Merging channels, Creating a quick mask, Editing masks using quick mask mode;

Painting and Editing: Brushes palette, Brush shape, Creating and Deleting brushes, Creating Custom brushes, Setting Brush Paint fade-out rate, Making, Adjusting, Moving, Copying, Extending, Reducing, Pasting and Deleting selections using selection tools, Softening the edges of a selection, Hiding a selection border

Sound: Recording Sound using Sound Recorder (Capture), Sound capture through sound editing software (ex: Sound Forge), Sound editing, Noise correction, Effect enhancement; Importing audio files from external devices and saving them; Sound Quality: CD Quality, Radio Quality, Telephone Quality

Voice Recording Software: Philips/Dragon, MIDI Player, Sound Recorder, Mono & Stereo

Sound File Format: AIFF (Audio Input File Format from Apple Mac) , MIDI, WAV, MP3, ASF (Streaming format from Microsoft)

Multimedia Application: Education (use of CAL tool), Entertainment , Edutainment, Virtual Reality, Digital Libraries, Information Kiosks, Video on Demand, Web Pages Video phone, Video conferencing and Health care.

Movie File Formats: AVI, MPEG, SWF, MOV, DAT;

Embedding Audio/Video on the web page;

Multimedia Authoring Using Macromedia Flash; Making of Simple Flash Movie, Setting Properties, Frame Rate, Dimensions, and Background Color;

Movie Frames: Concept of Frame, Frame Buffer, and Frame Rate, Creating a Key Frame;

Scene: Concept of Scene, Duplicate Scene, Add Scene, Delete Scene, and Navigating between Scenes;

Layers: Concept of Layer, Layer Properties, Layer Name, Show/Hide/Lock layers, Type of Layer - Normal/ Guide/Mask, Outline Color, Viewing Layer as outline, Layer Height, Adding/deleting a layer; Inserting Text Into the Frame, Inserting Graphical Elements into the frame, Converting Text/Graphics to Symbol, Inserting Symbol into the Frame, Setting Symbol Property (Graphics/Button/Movie), Inserting Blank Frame, Inserting Blank Key Frame, Inserting Key Frame into the Blank frame, Selecting all/Specific frames of a Layer, Copying/Pasting selected Frames; **Special Effects:** Motion Tweening, Shape Tweening, Color effect, Inserting Sound Layer; Testing a Scene and Movie; Import/Export (Movie/Sound and other multimedia objects);

Publishing: Publishing A Flash Movie; Changing publish Settings; Producing SWF(Flash Movie) for a HTML page in any of the possible formats like GIF image, JPEG Image (*.jpg), PNG Image, Windows Projector (*.exe), Macintosh Projector (*.hqx), Quick Time (*.mov), Real Player (*.smil); Testing with Publish Preview.

Programming in Python

Getting Started: Introduction to Python- an interpreted high level language, interactive mode and script mode.

Variables, Expressions and Statements: Values, Variables and keywords; Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements (Assignment statement); Taking input (using raw_input() and input()) and displaying output (print statement); Putting Comments.

Functions: Importing Modules (entire module or selected objects), invoking built in functions, functions from math module (for example, ceil, floor, fabs, exp, log, log10, pow, sqrt, cos, sin,

tan, degrees, radians), using random() and randint() functions of random module to generate random numbers, composition.

Defining functions, invoking functions, passing parameters (default parameter values, keyword arguments), scope of variables, void functions and functions returning values, flow of execution

Conditional constructs and looping: if else statement While, for (range function), break, continue, else, pass

Strings: Creating, initialising and accessing the elements; string operators: +, *, in, not in, range slice [n:m]; comparing strings using relational operators;

String functions and methods: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip.

Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations (joining, list slices);

List functions and methods: len, insert, append, extend, sort, remove, reverse, pop.

Dictionaries: Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, traversing,

appending, updating and deleting elements.

Dictionary functions & Methods: cmp, len, clear(), get(), has_key(), items(), keys(), update(), values()

Tuples: Immutable concept, creating, intialising and accessing the elements in a tuple; tuple functions: cmp(), len(), max(), min(), tuple()

Stacks and Queues with lists

Data File: Opening and closing files, file object, access_modes, reading and writing a file read(), readline(), readlines(), write(), file positions (seek(), tell()), renaming and deleting a file.

Classes (in Python):

Defining classes (attributes, methods), creating instance objects, accessing attributes and methods, using built in class attributes (dict, doc, name, module, bases), using _ _init_ _() , _ _del_ _() method and _ _ str_ _( ) in a class, private attributes (limited support), importance of "self" (acts as a pointer to current calling object)

Inheritance: Single and multiple inheritance- Overriding methods, using super() in derived class to invoke _init_() or overriden methods of parent class

8. **Study/Reference Material.**

Text Books of Class XI & XII published by various publishers. Following books are recommended by **CBSE for class XI & XII**.

SUGGESTED REFERENCE BOOKS / WEB RESOURCES (as suggested by CBSE)

TEXTBOOKS:
1. INFORMATICS PRACTICES (CLASS XI), CBSE
2. INFORMATICS PRACTICES (CLASS XII), CBSE

COMPUTER FUNDAMENTALS AND BOOLEAN ALGEBRA:
1. Rajaraman, FUNDAMENTALS OF COMPUTERS, Prentice Hall of India.
2. Peter Norton, INTRODUCTION TO COMPUTER, Tata McGraw Hill
3. Thomas C. Bartee, DIGITAL COMPUTER FUNDAMENTALS, McGraw Hill International.

WEB PAGE DEVELOPMENT:
1. Sybex, HTML Complete, BPB
2. Maccoy, MASTERING WEB DESIGNING, BPB
3. Russell, MASTERING ACTIVE SERVER PAGES, BPB
4. Sybex, ASP ADO AND XML COMPLETE, BPB
5. Simon, VBSCRIPT Interactive Course: Waite Group, BPB

COMMUNICATION AND OPEN SOURCE CONCEPTS:
1. A.S. Tanenbaum, COMPUTER NETWORK, Prentice Hall of India P. Ltd.

2. Williams Stalling, DATA COMMUNICATION AND NETWORKS, Prentice Hall of India P. Ltd.

3. Hancock, NETWORK CONCEPT AND ARCHITECTURES, BPB Publications.

INTRODUCTION TO PROGRAMMING

1. Heiko Böck, The Definitive Guide to the NetBeans Platform 6.5, Apress

RELATIONAL DATABASE MANAGEMENT SYSTEM AND SQL

1. Lerry Ulman, MYSQL Database, Pearson Education, 2008

2. C.J. Date, DATABASE PRIMER, Adison Wesley.

PROBLEM SOLVING AND PROGRAMMING IN C++

1. Robert Lafore, OBJECT ORIENTED PROGRAMMING IN TURBO C++, Galgotia Publications Pvt. Ltd.

2. David Parsons, OBJECT ORIENTED PROGRAMMING WITH C++, BPB Publications.

3. Bjarne Stroutrup, THE C++ PROGRAMMING LANGUGE, Adison Wesley.

DATA STRUCTURES

1. M.A. Weiss, Data Structures and Algorithm Analysis in C++. the Benjamin/Cummings Pub. Co., Inc.

2. Sartaj & Sahni, Fundamentals of Data Structure, Galgotia Book Source

Suggested Websites on e-Governance
- www.mit.gov.in
- www.esevaonline.com
- bhoomi.kar.nic.in
- aponline.gov.in
- www.chips.nic.in

Suggested Websites on e-Business
- www.salesforce.com
- www.zoho.com
- www.itcportal.com

Suggested Websites on e-Learning
- www.moodle.org
- www.atutor.ca
- www.w3schools.com
- portal.unesco.org
- www.opensource.org