A. Brief Review of Computer Systems
(30 Marks)

i) Evolution of Computers and Computer Organization : (10 marks)

- Evolution of Computers
  - Abacus, Napier’s Bone, Pascaline, The Babbage Machine
  - Stored Program Concept, Von Neumann Concept / Architecture

- Computer Hardware Generations
  - First, Second, Third, Fourth and Fifth Generation of Computers;
  - Components, Advantages, Disadvantages

- Concept of Circuit Integration
  - SSI, MSI, LSI, VLSI, ULSI

- Classification of Computers
  - Analogue, Digital, Hybrid Computers
  - Mainframe and Super Computer
  - Mini, Micro, Laptop Computer

- Computers in Modern Society

- Concept of Data and Information, Data Processing

- Brief description of each functional block of a computer
  - Block Diagram of a Computer System
  - Input Devices (Keyboard, Mouse, Scanner, Touch Screen, OMR, OCR, MICR, Graphic Tablet, Barcode Reader, Light Pen, Microphone, Joystick)
  - Output Devices
    - Monitor ñ CRT, LCD
    - Printer ñ Impact Printers (Dot Matrix Printer), Non-Impact Printers (Inkjet Printer, Laser Printer)
    - Plotter
  - Central Processing Unit : CU, ALU
  - Storage Devices
    - Primary Memory : RAM (DRAM, SRAM), ROM (PROM, EPROM, EEPROM, UVPROM)
    - Secondary Memory : Magnetic Media (HDD, FDD), Optical Media (CD, DVD, Blue-Ray Disk)
    - Cache Memory
    - Flash Memory
  - Communication Bus
    - System Bus ñ Address Bus, Data Bus, Control Bus, Power Bus
ii) **Data Representation : (10 Marks)**

- **Number Systems**
  - Concept of Non-Positional Number System
    - Roman Number System
  - Concept of Positional Number System
    - Decimal, Binary, Octal and Hexadecimal Number System
  - Conversion
    - Inter-conversion between Decimal, Binary, Octal and Hexadecimal Numbers (Whole numbers and Fractions, using Double Add and Half Add Methods)
  - Arithmetic
    - Addition, Subtraction of Decimal, Binary, Octal and Hexadecimal Numbers
    - Multiplication, Division of Binary Number System only
  - Different methods of Negative Number Representation
    - Signed Magnitude
    - One's Complement
    - Two's Complement
    - Subtraction using Complements (1's, 2's complement)

- **Various Binary Coding Schemes**
  - BCD
  - EBCDIC
  - ASCII
  - ISCII

- **Concept of Fixed and Floating Point Numbers**
  - Difference between fixed and floating point numbers

- **Bit map representation of images**

- **Concept of Multimedia**

iii) **Boolean Algebra (10 Marks)**

- Definition and postulates.
- Boolean operations OR, AND, NOT
- Proof using identities and truth tables
- DeMorgan's Theorems and Basic Principle of Duality
- Deriving truth table from Boolean expression and vice versa
- SOP and POS Expressions (Minterm and Maxterm expressions)
- Canonical form of Boolean expressions and their complements
- Simplifications
B. Software and Languages
(10 Marks)

- Definition of Software

- Programming Languages: Concepts of High Level, Low Level and Assembly language
- Types of Software
- System Software
  - Translator: compiler, interpreter, assembler
  - Operating systems:
    - Definition and Function
    - Types of OS: Single User, Multi-user, Multiprogramming, Multiprocessing, Time Sharing
    - Booting (cold and warm), Spooling, Buffering, Concept of Virtual Memory
    - Directory and file Structure, Path and Pathname
    - Concept of GUI, CUI with examples
    - Using MS DOS (Commands and their use: DIR, MD, RD, CD, COPY, CON, MOVE, REN, DEL, TYPE, MORE, ATTRIB, EDIT, DATE, TIME, CLS)
    - Using MS Windows OS

- Application Software (definition and example)
- Utility Software (definition and example)

C. Programming using Visual Basic
(10 Marks)

- Introduction to Visual Basic (Version 6 or compatible)
- Getting familiar with VB user interface
  - Standard exe, pull-down menus, toolbar, toolbox, project explorer, properties window, form layout window, form immediate window, opening and closing windows, resizing and moving windows, quitting VB
- VB Tool Box
  - Standard window controls, label, textbox, command-button, frame, check-box, option-button, list-box, combo-box, picture box, timer control, shapes
  - Basic properties of controls
- Programming Fundamentals
  - Date types in VB (integer, long, single, double, currency, string)
  - Variable and Constants
  - Input/Output operations
  - Control Statements
    - Branching: If-Then-Else, Switch
- Looping: For-Next, While, Do-While
- **Simple problem solving**

**D. Word Processing using MS Word**  
**(MS Office 2007 or compatible)**  
**(10 Marks)**

- Introduction to Word Processing  
- Creating, Opening, Editing and Saving a document  
- Copy, Cut, Paste operations  
- Page Setup, Headers and Footers  
- Formatting Texts, Paragraph, Page Borders  
- Inserting Clip-Art, Word-Art, Auto-Shapes, Picture, Symbol, Equation  
- Table insertion  
- Mail Merge  
- Macros  
- Spelling and Grammar check  
- Printer Setup and Document Printing

**E. Word Processing using MS Word**  
**(MS Office 2007 or compatible)**  
**(10 Marks)**

- Introduction of PowerPoint  
- Creating, Opening, Editing and Saving a PowerPoint presentation  
- Use of Wizards  
- Different styles and background  
- Formatting Texts  
- Inserting Clip-Art, Word-Art, Auto-Shapes, Picture  
- Applying slide-transition, applying animation to text and objects  
- Inserting sound and video-clips  
- Slide Show  
- Printing of slides

**F. Practical**  
**(30 Marks)**

- **One program on Visual Basic**  
- **Laboratory Copy (Minimum 10 programs)**  

(Suggestive programs on VB are given below)

- To display a message using Label, Textbox, Message Dialogue  
- To concatenate two text entries and display
To perform a simple arithmetic operation (+,-,*,/) and display the result in message dialogue or textbox

To make simple decision making (IF statement) solution and display relevant message (example: problems related to eligibility for a given value of age, profit/loss messages for given values of cost price and sale price, grade display for given values of marks of students etc.)

To create a simple GUI application to perform both arithmetic and logical operations together (Total, Average, Grade calculation of given set of marks, salary calculations on different criteria)

To create a simple GUI application to perform an operation based on the criteria input by the user in a checkbox/radio button
(ex1: Find the discount of an item on the basis of category of item [electrical appliance / electronic gadget/stationery specified using a radio button] and its cost [below 1000/above 1000/equal 1000 specified using radio button])
(ex2: Calculate the incentive of a sales person on the basis of his sales amount, customer feedback, count of customer specified using checkbox)

To create a simple GUI application to change the properties of a control based on the selection made by the user.
(ex1: To change the background/foreground colour of any of the controls of the form based on the colour selected from a list)
(ex2: To change the background/foreground colour of a label based on the values input/stored in a combo-box)

- Use of MS Word — Same features as in Theory part (5 Marks)
- Use of PowerPoint — Same features as in Theory part (5 Marks)
- Viva Voce (5 Marks)
A. Logic Gate and Combination Circuits (15 marks)

- Logic Gates Ï OR, AND, NOT, XOR, X-NOR Gates
- Universal Gates Ï NAND and NOR Gate
- Basic gates using Universal Gates
- Two Level Circuits
- Combinational Circuits:
  - Half Adder & Full Adder (definition and representation)
  - Full Adder using Half Adders only
  - Half Subtractor & Full Subtractor (definition and representation)
  - 4 bit Adder and Subtractor Circuit
  - Multiplexer (4x1) and De-multiplexer (1x4)
  - Decoder (Maximum 3 bits), and Encoder (Decimal to Binary, Octal to Binary)

B. Networking (20 marks)

- Introduction to Networking (Definition, Advantage, Disadvantage, Application)
  - Analogue and Digital Communication
  - Modes of Communication: Simplex, Half Duplex and Full Duplex Communication
  - Types of Network Ï LAN, MAN, WAN
  - Network Architecture: Client Server & Peer-to-Peer Networks
  - Serial and Parallel Communication
  - Bandwidth, Channel Capacity, Baud
  - Synchronous and Asynchronous Transmission Modes
  - Baseband and Broadband Networks

- Components of a Network
  - Servers (File server, Communication Server, Print Server) and Workstation
  - NIC
  - Guided Media
    - Cables Ï UTP, STP, Co-axial, Fibre Optic
  - Unguided Media
    - Infrared, Radio & Microwave Communication, Satellite
  - Network Operating System Ï Characteristics

- Network Topologies -
  - Bus
  - Rind
- **Network Connecting Devices** –
  - Hub
  - Repeater
  - Bridge
  - Switch
  - Router
  - Gateways

- **LAN Protocols**
  - Ethernet (CSMA / CD) and Token Ring Protocol

- **Switching Technique**
  - Circuit, Message and Packet Switching

- **Use of MODEM**

- **TCP / IP Protocols** - TCP, IP, UDP, FTP, HTTP, TELNET

- **IP Addressing**
  - Class A, Class B, Class C IP address

- **Domain Name System**

- **URL**

- **Introduction to Internet**
  - Basic requirement for connecting to the Internet, ISP
  - Services provided by Internet – www, browser, e-mail, search engine, social networking
  - Networking Security – Computer Virus, Concept of Firewall, Password

- **HTML**
  - Basic Page Design, Using Ordered and Unordered Lists, Using Image, Hyperlinking, Using Tables

**C. Database Management System** (15 marks)

- **Introduction of Database** :
  - Definition of Database
  - Advantage and disadvantages of DBMS
  - Database Languages (DDL, DML, DCL)
  - Data Dictionary, Metadata
  - Database Schema and Instance
  - DBMS and its components
- Various Data Models – ER Model, Hierarchical Model, Network Model, Relational Model (only concepts)
- Different Database Users
- Functions of DBA

**Relational Model**
- Concept of Relation, Topple, Attribute, Domain, Degree, Cardinality
- Concept of Keys – Key, Super Key, Candidate Key, Primary Key, Alternate Key
- Concept of Relationships – 1:1, 1:N, N:M relationships
- Database Constraints – Equity Integrity Constraint, Domain Constraint, Referential Integrity Constraint and Concept of Foreign Key

**Relational Algebra**
- Selection Operation
- Projection Operation
- Set Operation
- Cartesian Product
- Natural Join Operation

**SQL**
- Simple SELECT Queries (SELECT, FROM, WHERE, DISTINCT, AND, OR, IN, NOT IN, BETWEEN, LIKE, ORDER BY)

**D. Introduction to Spread Sheet – (MS Office 2007 or compatible) (10 marks)**

- Introduction to Excel
- Concept of Workbook, Worksheet, Row, Column, Cell
- Creating Opening, Editing, Saving a Workbook
- Changing Row and Column widths
- Formatting cells
- Different data types in Excel
- Entering labels and values
- Use of following inbuilt functions only – SUM, PRODUCT, AVERAGE, MAX, MIN, ROUND, COUNT, COUNTIF, IF, AND, OR, NOT, DATE, TIME, NOW, CONCATENATE, UPPER, LOWER
- Copying Cells – Relative, Absolute and Mixed Referencing
- Making calculations and re-calculations
- Auto fill, Fill with series
- Conditional Formatting
- Sorting and Filtering Data (use of Auto Filter)
- Goal Seek
- Hiding Rows and Columns
- Use of Macros
- Creating Line Diagrams, Pie Charts, Bar Graphs
E. Using MS Access (MS Office 2007 or compatible) (10 marks)

- Introduction to Access
- Table creating using Design View and Wizard
- Different data types in Access
- Manipulation of data using Access facilities (Inserting, Updating, Deleting data)
- Creating Relationships between Tables
- Form creation using Wizard, Auto Form
- Query generation using Design View
- Report generation using Wizard, Auto Report

E. Practical (30 marks)

- Using MS Excel and Access (10 marks)
- Web Page design using HTML (5 marks)
- Project Work (two projects) (10 marks)
  - Suggestive Topics:
    - Application of Excel:
      - Using Excel creation of Mark Sheet, Balance Sheet, Monthly / Yearly Expenditure, Reports
    - Web page designing using HTML (minimum 5 linked pages)
      - Travel and Tourism
      - Festivals
      - Book Catalogue
      - Pollution and pollution control
    - Viva Voce (5 marks)