BCA Previous Year Question Paper 2024

Subject: Computer Fundamentals

Time: 3 Hours Maximum Marks: 100

Instructions:

- Answer all questions from Section A
- Answer any FOUR questions from Section B
- Answer any TWO questions from Section C
- Answer any ONE question from Section D

SECTION A (20 Marks)

Answer all questions. Each question carries 2 marks.

Q1. Define computer and list its basic characteristics.

Ans: Computer is an electronic device that accepts data, processes it according to instructions, and produces meaningful output. Basic characteristics:

- Speed: Performs millions of operations per second
- Accuracy: Produces error-free results when given correct input
- Automatic: Works automatically once programmed
- Storage: Can store large amounts of data
- Versatility: Can perform various types of tasks

Q2. What is the difference between hardware and software?

Ans:

- **Hardware:** Physical components of computer system (CPU, RAM, Hard disk, Monitor, etc.)
- **Software:** Set of instructions/programs that tell hardware what to do (Operating System, Applications, etc.)

Q3. Convert $(25)_{10}$ to binary and hexadecimal.

Ans:

- Binary: $(25)_{10} = (11001)_2$
- Hexadecimal: $(25)_{10} = (19)_{16}$

Q4. Define algorithm and flowchart.

Ans:

- **Algorithm:** Step-by-step procedure to solve a problem
- **Flowchart:** Graphical representation of algorithm using symbols and flowlines

Q5. What are input and output devices? Give two examples each.

Ans:

- **Input Devices:** Used to enter data into computer. Examples: Keyboard, Mouse
- **Output Devices:** Used to get processed information from computer. Examples: Monitor, Printer

Q6. What is an operating system? Name any two popular operating systems.

Ans: Operating system is system software that manages computer hardware and software resources. Examples: Windows, Linux

Q7. Define bit, byte, and word.

Ans:

- **Bit:** Smallest unit of data (0 or 1)
- **Byte:** Collection of 8 bits
- **Word:** Group of bits/bytes processed as a unit (typically 16, 32, or 64 bits)

Q8. What is the difference between RAM and ROM?

Ans:

- **RAM:** Volatile memory, data lost when power off, read/write operations
- **ROM:** Non-volatile memory, data retained without power, mainly read operations

Q9. Define compiler and interpreter.

Ans:

- **Compiler:** Translates entire program at once into machine code
- **Interpreter:** Translates and executes program line by line

Q10. What is a computer virus?

Ans: Computer virus is a malicious program that replicates itself and infects other programs or files, causing damage to system or data.

SECTION B (40 Marks)

Answer any FOUR questions. Each question carries 10 marks.

Q11. Explain the block diagram of a computer system with neat diagram.

Ans: A computer system consists of four main functional units:

Components:

1. **Input Unit:** Accepts data and instructions from user
2. **Central Processing Unit (CPU):**
    - Control Unit: Controls and coordinates all operations
    - Arithmetic Logic Unit (ALU): Performs arithmetic and logical operations
3. **Memory Unit:** Stores data and instructions
4. **Output Unit:** Presents processed information to user

Working:

- Input unit receives data and sends to memory
- Control unit fetches instructions from memory
- ALU performs calculations as directed by control unit
- Results stored in memory and sent to output unit

Q12. Discuss different generations of computers with their characteristics.

Ans:

First Generation (1940-1956):

- Technology: Vacuum tubes
- Examples: ENIAC, UNIVAC-I
- Characteristics: Large size, high power consumption, limited programming capability

Second Generation (1956-1963):

- Technology: Transistors
- Examples: IBM 7094, CDC 1604
- Characteristics: Smaller, faster, more reliable than first generation

Third Generation (1964-1971):

- Technology: Integrated Circuits (ICs)
- Examples: IBM System/360, PDP-8
- Characteristics: Much smaller, lower cost, higher reliability

Fourth Generation (1971-1980):

- Technology: Microprocessors
- Examples: Intel 4004, IBM PC
- Characteristics: Personal computers emerged, very small size

Fifth Generation (1980-present):

- Technology: VLSI, AI concepts

- Examples: Modern PCs, Laptops, Smartphones
- Characteristics: Parallel processing, artificial intelligence features

Q13. Explain different types of memory in computer system.

Ans:

Primary Memory:

1. **RAM (Random Access Memory):**
   - Volatile memory
   - Types: SRAM (Static), DRAM (Dynamic)
   - Used for temporary storage during program execution
2. **ROM (Read Only Memory):**
   - Non-volatile memory
   - Types: PROM, EPROM, EEPROM
   - Stores system boot instructions

Secondary Memory:

1. **Magnetic Storage:**
   - Hard Disk Drive (HDD)
   - Floppy Disk (obsolete)
2. **Optical Storage:**
   - CD, DVD, Blu-ray
3. **Solid State Storage:**
   - SSD, USB Flash drives

Cache Memory:

- High-speed memory between CPU and RAM
- Levels: L1, L2, L3 cache

Q14. Write an algorithm and draw flowchart to find the largest among three numbers.

Ans:

Algorithm:

```
Step 1: Start
Step 2: Input three numbers A, B, C
Step 3: If A > B then
            If A > C then
                Print "A is largest"
            Else
                Print "C is largest"
        Else
            If B > C then
                Print "B is largest"
            Else
                Print "C is largest"
Step 4: Stop
```

Flowchart: [Description: Start → Input A,B,C → Decision A>B? → Decision A>C? or B>C? → Print largest → Stop]

Q15. Explain the classification of computers based on size and capability.

Ans:

1. Supercomputers:

- Fastest and most powerful
- Used for complex scientific calculations
- Examples: IBM Blue Gene, Cray

2. Mainframe Computers:

- Large, powerful, expensive
- Support multiple users simultaneously
- Used in banks, airlines
- Examples: IBM z/OS systems

3. Minicomputers:

- Medium-sized, multi-user systems
- Less powerful than mainframes
- Examples: PDP-11, VAX

4. Microcomputers:

- Single-user systems
- Types:
  - Desktop computers
  - Laptop computers
  - Tablets
  - Smartphones

5. Workstations:

- High-performance single-user computers
- Used for engineering, graphics design
- Examples: Sun workstations

Q16. Discuss number systems used in computers with examples.

Ans:

1. Decimal Number System:

- Base: 10
- Digits: 0-9
- Example: $(125)_{10}$

2. Binary Number System:

- Base: 2
- Digits: 0, 1
- Used internally by computers
- Example: $(1101)_2 = (13)_{10}$

3. Octal Number System:

- Base: 8
- Digits: 0-7
- Example: $(17)_8 = (15)_{10}$

4. Hexadecimal Number System:

- Base: 16

- Digits: 0-9, A-F
- Used for memory addresses
- Example: $(1F)_{16} = (31)_{10}$

Conversion Examples:

- $(10)_{10} = (1010)_2 = (12)_8 = (A)_{16}$

SECTION C (30 Marks)

Answer any TWO questions. Each question carries 15 marks.

Q17. Explain different types of software with examples. Also discuss the software development life cycle.

Ans:

Types of Software:

1. System Software:

- **Operating Systems:** Windows, Linux, macOS
- **Device Drivers:** Printer drivers, graphics drivers
- **Utilities:** Antivirus, disk cleanup, file managers
- **Language Processors:** Compilers, interpreters, assemblers

2. Application Software:

- **General Purpose:** MS Office, web browsers, media players
- **Specific Purpose:** Accounting software, CAD software, games
- **Custom Software:** Developed for specific organization needs

3. Programming Software:

- **Text Editors:** Notepad++, Vim
- **IDEs:** Visual Studio, Eclipse, Code::Blocks
- **Debuggers:** Tools for finding and fixing errors

Software Development Life Cycle (SDLC):

1. Planning Phase:

- Define project scope and objectives
- Resource allocation and scheduling

2. Analysis Phase:

- Gather and analyze user requirements
- Create requirement specification document

3. Design Phase:

- System architecture design
- User interface design
- Database design

4. Implementation Phase:

- Actual coding of the software
- Module development and integration

5. Testing Phase:

- Unit testing, integration testing
- System testing, user acceptance testing

6. Deployment Phase:

- Installation and configuration
- User training

7. Maintenance Phase:

- Bug fixes and updates
- Performance enhancements
- Feature additions

Q18. Describe the components of CPU in detail. Explain how CPU executes instructions.

Ans:

Components of CPU:

1. Control Unit (CU):

- **Functions:**
  - Fetches instructions from memory
  - Decodes instructions
  - Controls execution sequence
  - Coordinates with other components
- **Components:**
  - Instruction Register (IR)

- Program Counter (PC)
- Instruction Decoder

2. Arithmetic Logic Unit (ALU):

- **Functions:**
  - Performs arithmetic operations (+, -, ×, ÷)
  - Performs logical operations (AND, OR, NOT)
  - Comparison operations
- **Components:**
  - Accumulator
  - Status Register (flags)

3. Registers:

- **Types:**
  - General Purpose Registers
  - Special Purpose Registers (PC, IR, MAR, MDR)
  - Index Registers
  - Stack Pointer

Instruction Execution Cycle (Fetch-Decode-Execute):

1. Fetch Phase:

- PC contains address of next instruction
- Control unit fetches instruction from memory
- Instruction loaded into IR

- PC incremented to point to next instruction

2. Decode Phase:

- Control unit decodes the instruction
- Determines operation to be performed
- Identifies operands required

3. Execute Phase:

- ALU performs the required operation
- Results stored in appropriate location
- Status flags updated if necessary

Example Execution:

```
Instruction: ADD R1, R2, R3 (R1 = R2 + R3)
1. Fetch: Get instruction from memory
2. Decode: Identify ADD operation, registers R1, R2, R3
3. Execute: ALU adds contents of R2 and R3, stores result in R1
```

Q19. Explain input/output devices in detail with their working principles.

Ans:

Input Devices:

1. Keyboard:

- **Working:** Press keys → electrical signals → scan codes → character codes

- **Types:** QWERTY, DVORAK, Ergonomic
- **Interfaces:** PS/2, USB, Wireless

2. Mouse:

- **Mechanical Mouse:** Ball rotation → rollers → optical encoders
- **Optical Mouse:** LED light → reflection from surface → sensor
- **Types:** Wired, wireless, trackball

3. Scanner:

- **Working:** Light source → document reflection → CCD sensors → digital image
- **Types:** Flatbed, sheet-fed, handheld
- **Applications:** Document digitization, OCR

4. Touch Screen:

- **Resistive:** Pressure-sensitive layers
- **Capacitive:** Electrical field changes
- **Applications:** Smartphones, tablets, kiosks

5. Microphone:

- **Working:** Sound waves → diaphragm vibration → electrical signals
- **Types:** Dynamic, condenser, ribbon

Output Devices:

1. Monitor/Display:

- **CRT:** Electron beam → phosphor coating → light emission
- **LCD:** Liquid crystals → light polarization → color filters
- **LED:** Light-emitting diodes for backlighting
- **OLED:** Organic compounds emit light directly

2. Printer:

- **Dot Matrix:** Pins strike ribbon → characters formed
- **Inkjet:** Ink droplets sprayed through nozzles
- **Laser:** Laser beam → drum charging → toner transfer

3. Speaker:

- **Working:** Electrical signals → electromagnet → cone vibration → sound waves
- **Types:** Woofer, tweeter, subwoofer

4. Plotter:

- **Working:** Pen movement controlled by computer
- **Types:** Drum plotter, flatbed plotter
- **Applications:** CAD drawings, maps

SECTION D (10 Marks)

Answer any ONE question. Each question carries 10 marks.

Q20. Write a detailed note on computer networks and internet. Explain different types of networks.

Ans:

Computer Networks: A computer network is a collection of interconnected computers and devices that can communicate and share resources.

Benefits:

- Resource sharing (files, printers, internet)
- Communication (email, messaging)
- Centralized data management
- Cost reduction
- Improved reliability

Types of Networks:

1. Based on Geographic Coverage:

Personal Area Network (PAN):

- Range: Within 10 meters
- Examples: Bluetooth devices, USB connections
- Technologies: Bluetooth, infrared, USB

Local Area Network (LAN):

- Range: Within a building or campus
- High speed, low cost
- Technologies: Ethernet, Wi-Fi
- Topologies: Star, ring, bus

Metropolitan Area Network (MAN):

- Range: Within a city
- Examples: Cable TV networks, city-wide Wi-Fi
- Technologies: Fiber optic, wireless

Wide Area Network (WAN):

- Range: Across countries/continents
- Examples: Internet, corporate networks
- Technologies: Satellite, leased lines

2. Based on Topology:

- **Bus:** All devices connected to single cable
- **Star:** All devices connected to central hub
- **Ring:** Devices connected in circular fashion
- **Mesh:** Every device connected to every other device

Internet: Global network of interconnected computers using TCP/IP protocol.

Components:

- ISPs (Internet Service Providers)
- Routers and switches
- Servers and clients
- Communication protocols

Services:

- World Wide Web (WWW)
- Email
- File Transfer Protocol (FTP)
- Social networking
- Cloud computing

Q21. Explain different programming languages and their classification. Discuss the process of program development.

Ans:

Programming Languages: Set of instructions used to communicate with computers to perform specific tasks.

Classification:

1. Based on Level:

Low-Level Languages:

- **Machine Language:**
  - Binary code (0s and 1s)
  - Directly understood by CPU
  - Fastest execution, difficult to program
- **Assembly Language:**
  - Uses mnemonics (ADD, MOV, JMP)
  - Requires assembler for translation

- Hardware dependent

High-Level Languages:

- English-like syntax
- Platform independent
- Examples: C, Java, Python, C++
- Requires compiler/interpreter

2. Based on Programming Paradigm:

Procedural Languages:

- Step-by-step approach
- Examples: C, Pascal, FORTRAN

Object-Oriented Languages:

- Based on objects and classes
- Examples: Java, C++, C#

Functional Languages:

- Based on mathematical functions
- Examples: LISP, Haskell

Scripting Languages:

- Interpreted languages
- Examples: JavaScript, Python, Perl

Program Development Process:

1. Problem Analysis:

- Understand the problem clearly
- Identify input, processing, output requirements
- Define constraints and limitations

2. Algorithm Development:

- Create step-by-step solution
- Use pseudocode or flowchart
- Ensure logic correctness

3. Coding:

- Choose appropriate programming language
- Write source code following syntax rules
- Use proper naming conventions and comments

4. Compilation/Interpretation:

- Convert source code to machine code
- Check for syntax errors
- Generate executable file

5. Testing and Debugging:

- **Unit Testing:** Test individual modules
- **Integration Testing:** Test module interactions
- **System Testing:** Test complete system

- **Debug:** Find and fix logical errors

6. Documentation:

- User manual
- Technical documentation
- Maintenance guide

7. Maintenance:

- Corrective maintenance (bug fixes)
- Adaptive maintenance (environment changes)
- Perfective maintenance (enhancements)
- Preventive maintenance (future problems)

Best Practices:

- Write clear, readable code
- Use meaningful variable names
- Add appropriate comments
- Follow coding standards
- Regular testing throughout development

END OF QUESTION PAPER