Revision Exercises 1

Page 1

1. **Which technology enables wireless charging for portable devices?** [cite: 2]
   a) USB-C
   b) NFC
   c) Qi
   d) Bluetooth

2. **Which storage type is commonly used in modern laptops for faster performance?** [cite: 2]
   a) HDD
   b) SSD
   c) Optical Drive
   d) Flash Drive

3. **Why is USB-C considered a universal standard for portable devices?** [cite: 2]
   a) It supports wireless communication
   b) It is only used for charging
   c) It supports data transfer, power delivery, and video output
   d) It is compatible with VGA

4. **What role does an eSIM play in modern smartphones and tablets?** [cite: 2]
   a) It enables expandable storage
   b) It replaces physical SIM cards with digital ones
   c) It powers the device during updates
   d) It enhances camera quality

5. **Arrange the following steps in the correct order to switch the laptop display between the built-in screen and an external monitor:** [cite: 2]

   1. Press the function key (e.g., Fn) along with the designated display switch key (e.g., F4, F8, or similar, depending on the laptop).
   2. Connect the external monitor to the laptop using the appropriate cable (e.g., HDMI, VGA).
   3. Select the desired display mode (e.g., Duplicate, Extend, or Second Screen Only) from the on-screen options.
   4. Ensure the external monitor is powered on.
   5. Verify the display configuration to ensure it works as expected.

Page 2

1. **Complete the table below by selecting the most appropriate cleaning method for each component from the options provided.** [cite: 3]

   | Laptop Component | Cleaning Procedure | |---|---| | 1. Laptop Screen | | | 2. Keyboard | | | 3. Touchpad | |

   Options (choose the most appropriate for each):
   a) Avoid excessive moisture and gently wipe the surface with an alcohol-based wipe or microfiber cloth.
   b) Use a microfiber cloth dampened with a cleaning solution.
   c) Use compressed air to blow out dirt.

2. **Compare the advantages and limitations of HDMI and VGA ports.** [cite: 3]

3. **Assess the significance of SIM card functionality in portable devices.** [cite: 3]

4. **Design a checklist for maintaining a personal laptop.** [cite: 3]

5. **What is the primary difference between primitive and non-primitive data structures?** [cite: 3]
   a) Primitive structures are always static, while non-primitive structures are dynamic.
   b) Primitive structures store single data elements, while non-primitive structures store multiple related elements.
   c) Primitive structures use pointers, while non-primitive structures do not.
   d) Non-primitive structures can only store numerical data.

6. **What does a node in a linked list typically contain?** [cite: 3]
   a) Data and a pointer to the next node
   b) Data and its index
   c) Only the data
   d) Only a pointer

7. **Why is the choice of data structure important in programming?** [cite: 3]

8. **Why are linked lists preferred over arrays for dynamic data manipulation?** [cite: 3]

9. **Write a C++ function to perform Binary Search on a sorted array.** [cite: 3]

Page 3

1. **Compare binary search and linear search algorithms.** [cite: 4]

2. **Evaluate the Pre-order, In-order, and Post-order traversals of the given binary tree and select the correct option for each traversal.** [cite: 4]
   Binary tree representation:
   ``` A / \ B C / \ / D E F ```

   Options:
   1. Pre-order Traversal
   a) A, B, D, E, C, F
   b) B, D, E, A, C, F
   c) D, B, E, A, C, F
   d) A, C, F, B, D, E

   2. In-order Traversal
   a) A, B, D, E, C, F
   b) D, B, E, A, C, F
   c) B, D, E, A, F, C
   d) A, C, F, B, D, E

   3. Post-order Traversal
   a) A, B, D, E, C, F
   b) B, D, E, A, C, F
   c) D, B, E, F, C, A
   d) D, E, B, F, C, A

3. **Design a natural language algorithm for implementing a circular queue using an array.** [cite: 4]
   ```

4. **Which of the following is not a property of a computer network?** [cite: 4]
   a) Scalability
   b) Reliability
   c) Data destruction
   d) Quality of Service (QoS)

5. **What does a node in a network represent?** [cite: 4]
   a) A single user in the system
   b) A computer or device connected to the network
   c) The central hub of a network
   d) A cable connection in the network

6. **Why is network scalability important?** [cite: 4]
   a) It allows adding more users without affecting performance.

Page 4

1. **(continued)**
   b) It ensures maximum security in the network. [cite: 6]
   c) It reduces the cost of hardware installations. [cite: 6]
   d) It eliminates the need for network administrators. [cite: 6]

2. **How does a router differ from a switch?** [cite: 6]
   a) A router connects devices within a LAN, while a switch connects multiple networks.
   b) A router connects multiple networks, while a switch connects devices within a LAN.
   c) A router provides power to network devices, while a switch manages IP addresses.
   d) A router is used only for wireless networks, while a switch is used for wired networks.

3. **What is the role of the Access Point in a wireless network?** [cite: 6]
   a) To manage IP addresses of connected devices
   b) To enable wired connections to switches
   c) To act as a central device for connecting wireless devices
   d) To prevent unauthorized access to a network

4. **Demonstrate the process of setting up a peer-to-peer network.** [cite: 6]

5. **Analyze the following statements about firewalls in ensuring network security and determine whether each statement is True or False.** [cite: 6]
   a) Firewalls monitor and control incoming and outgoing network traffic based on predefined security rules.
   b) Firewalls can completely eliminate all types of cyber threats from a network.
   c) A firewall can be hardware-based, software-based, or a combination of both.
   d) Firewalls are responsible for encrypting data to ensure secure communication between devices.
   e) Firewalls help in increasing unauthorized access to private networks.

6. **Explain the role of DNS in a network environment.** [cite: 6]

7. **Propose a design for a secure peer-to-peer file-sharing network.** [cite: 6]

8. **In a hierarchical model, data is organized in what structure?** [cite: 6]
   a) Graph
   b) Tree
   c) Relational Table
   d) Network

9. **Why is data redundancy a problem in traditional file systems?** [cite: 6]
   a) It increases data integrity.
   b) It leads to storage wastage and inconsistencies.

Page 5

1. **(continued)**
   c) It enhances data sharing among users. [cite: 8]
   d) It ensures data security. [cite: 8]

2. **Analyze the role of data independence in database architecture.** [cite: 8]

3. **Propose a method for implementing a backup and recovery strategy for a database.** [cite: 8]

4. **Which model is most commonly used at the conceptual level?** [cite: 8]
   a) Relational Model
   b) Network Model
   c) Hierarchical Model
   d) Entity-Relationship Model

5. **What is the goal of database normalization?** [cite: 8]
   a) To reduce query execution time
   b) To eliminate redundancy and improve consistency
   c) To enhance database encryption
   d) To increase the size of database tables

6. **How does the logical level differ from the conceptual level?** [cite: 8]
   a) The logical level deals with abstract concepts, while the conceptual level focuses on relational structures.
   b) The logical level converts abstract concepts into relational structures, while the conceptual level defines the abstract framework.
   c) The logical level handles data encoding, while the conceptual level manages user interactions.
   d) Both levels are identical in functionality.

7. **Why are referential columns used in relational databases?** [cite: 8]
   a) To encrypt data stored in tables
   b) To link related data between tables
   c) To increase the size of database tables
   d) To simplify user queries

8. **Below are statements about the steps to optimize a poorly designed database using normalization. Match each step (Column A) with its correct description (Column B).** [cite: 8]

   | Column A (Steps) | Column B (Descriptions) | |---|---| | 1. Identify and eliminate repeating groups | a) Break down tables to ensure each table focuses on a single subject or concept. | | 2. Remove partial dependencies | b) Ensure that no non-prime attribute depends on another non-prime attribute. | | 3. Eliminate transitive dependencies | c) Create a key column in every table to maintain data uniqueness and integrity. | | 4. Organize data into distinct tables | d) Separate multi-valued attributes into their own tables. | | 5. Ensure the use of a primary key | e) Ensure that every non-key attribute is fully dependent on the primary key. |

Page 6

1. **Compare the features of conceptual, logical, and physical database design levels.** [cite: 10]

2. **Evaluate the role of primary and foreign keys in maintaining referential integrity.** [6 Marks] [cite: 10]

3. **Design an ERD for a library system with the following entities: Books, Members, and Transactions.** [cite: 10]

   Entities and their Attributes:

   - **Book Entity**: authno, isbn number, title, edition, category, price. **Primary Key**: ISBN
   - **Reader Entity**: UserId, Email, address, phone no, name (composite attribute: firstname, lastname). Phone no is multi-valued. **Primary Key**: UserId
   - **Publisher Entity**: PublisherId, Year of publication, name. **Primary Key**: PublisherId
   - **Authentication System Entity**: LoginId, password. **Primary Key**: LoginId
   - **Reports Entity**: UserId, Reg*no, Book*no, Issue/Return date. **Primary Key**: Reg_no
   - **Staff Entity**: name, staff*id.* ***Primary Key****: staff*id
   - **Reserve/Return Relationship Set**: Reserve date, Due date, Return date

   Relationships between Entities:

   - A reader can reserve N books, but one book can be reserved by only one reader (1:N).
   - A publisher can publish many books, but a book is published by only one publisher (1:N).
   - Staff keeps track of readers (M:N).
   - Staff maintains multiple reports (1:N).
   - Staff maintains multiple books (1:N).
   - Authentication system provides login to multiple staff (1:N).

4. **Which operator is used to obtain the address of a variable?** [cite: 10]
   a) *
   b) &
   c) ->
   d) ::

5. **What does the dereference operator (*) do in C++?** [cite: 10]
   a) Access the address of a pointer
   b) Access the value pointed to by a pointer
   c) Increment a pointer
   d) Compare two pointers

6. **What is the difference between static and dynamic memory allocation?** [cite: 10]
   a) Static memory is allocated at compile time, while dynamic memory is allocated at runtime.

Page 7

1. **(continued)**
   b) Static memory is larger than dynamic memory. [cite: 12]
   c) Static memory is faster than dynamic memory. [cite: 12]
   d) Dynamic memory cannot be freed. [cite: 12]

2. **Why are structures used in C++?** [cite: 12]

a) To perform arithmetic operations
b) To group variables of different types under one name
c) To create loops
d) To manage pointers

3. **Complete the following C++ program by filling in the blanks to demonstrate the use of the new and delete operators for dynamic memory allocation. The program should allocate memory for 5 elements, store values, display them, and then deallocate the memory.** [cite: 12]

```cpp
# include

using namespace std; int main() { int *arr; arr = new int[5]; // Allocate memory for 5 elements for (int i = 0; i < 5; i++) { arr[i] = i + 1; // Assign values to the array } cout << "Array elements: "; for (int i = 0; i < 5; i++) { cout << arr[i] << " "; // Display the elements } cout << endl; delete[] arr; // Free memory return 0; }
```

4. **Write a C++ program to use a structure to store and display employee details (Name, ID, Salary).** [cite: 12]

5. **Analyze the advantages and risks of using dynamic memory allocation in C++.** [cite: 12]

6. **Compare the use of pointers and arrays in C++ programs.** [cite: 12]

7. **Evaluate the efficiency of using structures for grouping data over separate variables.** [cite: 12]

8. **Design a C++ program to implement a singly linked list using structures and dynamic memory allocation to insert and display three elements 10, 20, and 30.** [cite: 12]

Page 8

1. **Write a C++ program to demonstrate nested structures with a Student-Address relationship. Student structure's members are name, id, while those of Address are province, district, marks, and grade.** [cite: 14]

2. **What does encapsulation refer to in C++?** [cite: 14]
a) Binding data and functions together in a class
b) Hiding class methods
c) Defining multiple functions with the same name
d) Allocating dynamic memory

3. **In C++, the symbol :: is called the __ operator, used to define member functions outside a class.** [cite: 14]

4. **What is a friend function in C++?** [cite: 14]
a) A function that belongs to two or more classes
b) A non-member function with access to private data of a class
c) A function that returns multiple objects
d) A protected function inside a class

5. **Complete the following statements about Object-Oriented Programming by filling in the blanks with appropriate terms.** [cite: 14]

i. Object-Oriented Programming (OOP) emphasizes on __ rather than procedures.
ii. A __ is a blueprint for creating objects.
iii. __ refers to combining data and functions into a single unit.
iv. The concept of __ allows a class to inherit properties from another class.
v. __ is used to define different behaviors for functions with the same name.

6. **Which of the following demonstrates polymorphism in C++?** [cite: 14]
   a) Friend functions
   b) Operator overloading
   c) Data abstraction
   d) Constructor overloading

7. **True or False: In C++, the constructor of a base class is automatically inherited by derived class.** [cite: 14]

8. **Why is inheritance useful in C++?** [cite: 14]
   a) It hides implementation details.
   b) It reduces code redundancy by reusing existing class code.
   c) It enables private data sharing between unrelated classes.
   d) It simplifies operator overloading.

9. **What is the role of a destructor in C++?** [cite: 14]
   a) To delete private data
   b) To release resources allocated to an object
   c) To create copies of an object
   d) To enable inheritance

10. **Match the following OOP concepts with their descriptions:** [cite: 14]

    | Concepts | Descriptions | |---|---| | a) Encapsulation | 1) Allows multiple forms for a function | | b) Polymorphism | 2) Hides implementation details from external access | | c) Inheritance | 3) Enables reusing properties and methods from a base class |

Page 9

1. **What is the significance of access specifiers in inheritance?** [cite: 16]
   a) They dictate the visibility of base class members in derived classes.
   b) They allow access to global variables.
   c) They restrict the use of constructors.
   d) They improve runtime performance.

2. **Write a C++ program to demonstrate single inheritance with base and derived classes for calculating the area of a rectangle.** [cite: 16]

3. **Write a C++ program using a friend function to access private data and calculate the tax on an employee's salary which is 30% of the salary.** [cite: 16]

4. **Write a program to demonstrate the use of a copy constructor in C++ for copying student's name and age details.** [cite: 16]

5. **Compare the characteristics and applications of public and protected inheritance in C++.** [cite: 16]

6. **Analyze the benefits of polymorphism in object-oriented design.** [cite: 16]

7. **Analyze the following statements about operator overloading and its effect on program readability. For each statement, determine whether it is True or False.** [cite: 16]
   a) Operator overloading allows the same operator to be used for different data types, making code more intuitive and readable.
   b) Using operator overloading excessively can make the code harder to understand, as it may confuse the reader about the operator's intended functionality.
   c) Operator overloading can reduce the readability of code when it is applied to complex types that the reader may not be familiar with.

Page 10

1. **(continued)**
   d) Proper use of operator overloading can make code more self-explanatory by allowing operators to express complex operations in a clear, readable manner. [cite: 18]
   e) The overuse of operator overloading can lead to ambiguous code, making it difficult for a programmer to discern the exact purpose of an overloaded operator. [cite: 18]

2. **Create a C++ program to demonstrate function overloading with different parameter types to add two numbers.** [cite: 18]

3. **Design a multi-level inheritance model in C++ for a library system that manages information about books, borrowed books, and library records.** [cite: 18]
   Use the following classes and implement their respective jobs:

   - **Book**: A base class that holds the title of the book and provides a method to set the title.
   - **Borrowed Book**: A derived class from Book that includes the name of the borrower and a method to set the borrower's name.
   - **Library Record**: A derived class from BorrowedBook that provides functionality to display the book's title and the borrower's name.
     Write a program to create a LibraryRecord object, set its title and borrower information, and display the record details.

4. **Create a C++ program to demonstrate operator overloading for a complex number class that takes two complex numbers and adds them. Remember, a complex number has two parts, real and imaginary.** [cite: 18]

5. **What does Visual Basic stand for?** [cite: 18]
   a) Variable Basic
   b) Visual Beginners' All-Purpose Symbolic Instruction Code
   c) Virtual Base Syntax Instruction Compiler
   d) Visual Binary Assembly Script

6. **Which version of Visual Basic introduced Rapid Application Development (RAD)?** [cite: 18]
   a) Visual Basic 4.0
   b) Visual Basic 5.0
   c) Visual Basic 6.0
   d) Visual Basic.NET

7. **What is a standard EXE project in Visual Basic used for?** [cite: 18]
   a) Developing web applications
   b) Creating stand-alone applications

c) Running background services
d) Building APIs

8. **What are the key features of event-driven programming in Visual Basic?** [cite: 18]
   a) Executes instructions sequentially without interruptions.
   b) Executes code based on user actions or events.
   c) Focuses on algorithms rather than user interactions.
   d) Requires command-line inputs for all operations.

Page 11

1. **What is the difference between an Option Button and a CheckBox in Visual Basic?**
   a) Option Buttons allow multiple selections, while CheckBoxes do not
   b) Option Buttons are used for text input, while CheckBoxes are not
   c) Option Buttons allow single selection, while CheckBoxes allow multiple selections
   d) Both serve the same purpose

2. **Write the steps to create a form in Visual Basic with a Label and a Button to display a message.**

3. **Compare the advantages and disadvantages of Visual Basic 6.0 for desktop application development.**

4. **Evaluate the differences between event-driven programming and procedural programming.**

5. **Design a Visual Basic program to simulate a login form with username and password validation.**

6. **Which of the following is a valid variable name in Visual Basic?**
   a) 2Years
   b) My.house
   c) Your Name
   d) Her&hermother

7. **Which data type is used to store a large range of numeric values in Visual Basic?**
   a) Byte
   b) Integer
   c) Long
   d) Boolean

8. **What is the default data type assigned to variables not explicitly declared?**
   a) Integer
   b) Variant
   c) String
   d) Boolean

9. **What is the purpose of the Mod operator in Visual Basic?**
   a) To perform multiplication
   b) To find the remainder after division
   c) To concatenate strings
   d) To compare two values

10. **What is the difference between numeric and non-numeric data types?**
    a) Numeric data types store characters, while non-numeric data types store numbers.
    b) Numeric data types can be manipulated mathematically, while non-numeric data types cannot.

Page 12

1. **Which logical operator in Visual Basic evaluates to True only when both operands are False?**
   a) Or
   b) Not
   c) And
   d) Nor

2. **How does a For...Next loop differ from a While loop?**
   a) A For loop executes a fixed number of times, while a While loop runs infinitely.
   b) A For loop uses a counter variable, while a While loop uses a condition.
   c) A For loop cannot include nested loops, while a While loop can.
   d) A For loop executes faster than a While loop.

3. **Write a Visual Basic program that uses a command button to calculate the sum and average of three floating-point numbers entered by the user through textboxes.**

4. **Write a Visual Basic program to display on a listbox the multiplication table for a number entered by the user.**

5. **Compare the use of If...Then...Else and Select Case structures in Visual Basic application decision-making.**

6. **Analyze the benefits and drawbacks of using global variables in Visual Basic.**

7. **Evaluate the use of relational and logical operators in Visual Basic application decision-making.**

8. **Design a Visual Basic program to simulate a grading system based on student marks using Select Case.**

9. **Create a Visual Basic program to calculate the factorial of a number using a Do While loop.**

10. **What is the purpose of the 'static' keyword in Java?**
    a) To declare variables that cannot be modified
    b) To define shared class-level methods or variables
    c) To define methods accessible only by objects
    d) To override the main method

11. **Which of the following is not a Java primitive data type?**
    a) Boolean
    b) Float
    c) Long
    d) Byte

12. **Why is Java considered platform-independent?**
    a) It runs directly on hardware
    b) Java programs are compiled into bytecode

Page 13

1. **(continued)**
   that runs on any JVM.
   c) It uses machine code instead of high-level code.
   d) It doesn't need a compiler or interpreter.

2. **What happens when a Java program does not include a main method?**
   a) The program runs successfully without any errors.
   b) The compiler throws a syntax error.
   c) The JVM throws a runtime error.
   d) The program executes but skips the main logic.

3. **Write a Java program to print the multiplication table of a given number.**

4. **Write a Java program to calculate the factorial of a number using a loop.**

5. **Compare the advantages and disadvantages of using loops versus recursion in Java based on the aspects below in the table:**

   | Aspect | Loops | Recursion | |----------------|-------|-----------| | Performance | | | | Memory Usage | | | | Readability | | | | Debugging | | | | Use Cases | | |

6. **Evaluate the advantages of Java's multithreading feature in modern applications.**

7. **Write a Java program to demonstrate inheritance by creating a base class Vehicle with derived classes Car and Bike. Include attributes and methods for each class.**

8. **What is the primary purpose of the 'this' keyword in Java?**
   a) To refer to static variables
   b) To refer to the current object
   c) To define abstract methods
   d) To invoke parent class constructors

9. **What type of inheritance does Java not support through classes?**
   a) Single
   b) Hierarchical
   c) Multiple
   d) Multilevel

10. **What is the difference between default and parameterized constructors?**
    a) Default constructors initialize objects with parameters, while parameterized constructors do not.

Page 14

1. **(continued)**
   b) Parameterized constructors require arguments, while default constructors do not.
   c) Default constructors are defined by the programmer, while parameterized constructors are provided by the compiler.
   d) Default constructors do not exist in Java.

2. **What happens if a constructor is declared private?**
   a) The class can be instantiated normally.
   b) The class cannot be extended.
   c) Objects of the class cannot be created from outside the class.
   d) The class behaves like an abstract class.

3. **Write a Java program to demonstrate the use of a default constructor and a parameterized constructor in a class called Person. The default constructor will assign the initial values "Unknown" and 0 to instance variables name and age respectively, while the parameterized constructor will assign the values received as arguments from the main to the instance variables.**

The class Person also includes a method displayInfo to print the information.

4. **Write a Java program to demonstrate the use of the `this` keyword for distinguishing local variables and instance variables in a class called Student.**

5. **Compare the use of constructors and methods in Java. Highlight at least three key differences.**

6. **Examine the implications of method overriding in Java. Discuss its advantages and limitations.**

7. **Evaluate the importance of abstraction in designing Java applications.**

8. **Design a Java program to demonstrate hierarchical inheritance where a base class Animal has a method call(), and two derived classes Dog and Cat inherit from it. The Dog class should have a method bark(), and the Cat class should have a method meow(). Include a main method to instantiate objects of Dog and Cat classes, invoke the inherited method call() from the Animal class, and call their respective unique methods bark() and meow(). Write the full code implementation.**

9. **What does the term "stream" refer to in Java IO?**
   a) A sequence of operations
   b) A sequence of data values from an input source or output destination
   c) A method to handle exceptions
   d) A Java thread for background processes

Page 15

1. **Which of the following methods is used to read a line of text in BufferedReader?**
   a) readLine()
   b) nextLine()
   c) read()
   d) next()

2. **Why is the Scanner class preferred for reading user input?**
   a) It provides synchronized methods.
   b) It offers convenient methods for parsing primitive types and strings.
   c) It directly connects to file streams.
   d) It is faster than other input methods.

3. **How does the DataInputStream differ from BufferedReader?**
   a) DataInputStream reads byte-based data, while BufferedReader reads character-based data.
   b) DataInputStream supports string parsing, while BufferedReader does not.
   c) BufferedReader is faster for binary data, while DataInputStream is better for text.
   d) Both serve the same purpose and are interchangeable.

4. **Write a Java program using Scanner to read an integer and a double from the user and display them.**

5. **Write a Java program to copy content from one file to another using FileInputStream and FileOutputStream.**

6. **Write a program to demonstrate reading a line of text from the console using BufferedReader.**

7. **Compare the advantages and disadvantages of Scanner, BufferedReader, and DataInputStream.**

8. **Critique the effectiveness of Java IO Streams for modern application development. Focus on their strengths and weaknesses.**

9. **Design a Java program to append text to an existing file using FileWriter.**