



PAN AFRICA CHRISTIAN UNIVERSITY

BSIT/BBIT

END OF TERM EXAMINATION

DEPARTMENT: COMPUTING & INFORMATION TECHNOLOGY

COURSE CODE: BSIT/BBIT

CAMPUS: ROYSAMBU

COURSE TITLE: OBJECT ORIENTED PROGRAMMING

EXAM DATE: DAY OF WEEK, DATE (DDTH MONTH YEAR)

TIME: START HOUR – END 13:00-17:00 HRS

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other three questions in Section **B**.
- None programmable calculators permitted
- Calculators on phones, tablets and computers are NOT permitted in Theory Papers

SECTION A

(Answer ALL questions in this section)

QUESTION 1

Use the program below to answer the questions that follow:

```
import java.util.Scanner;
public class StudentGrades {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int numStudents;
        System.out.print("Enter the number of students: ");
        numStudents = scanner.nextInt();
        int[] grades = new int[numStudents]
        for (int i = 0; i < numStudents; i++) {
            System.out.print("Enter grade for student " + (i + 1) + ": ");
            grades[i] = scanner.nextInt();
        }
        switch (grades[0] / 10) {
            case 10:
            case 9:
                System.out.println("Grade: A"); break;
            case 8:
                System.out.println("Grade: B"); break;
            case 7:
                System.out.println("Grade: C"); break;
            case 6:
                System.out.println("Grade: D"); break;
            default:
                System.out.println("Grade: F"); break;
        }
        int maxGrade = grades[0];
        for (int i = 1; i < numStudents; i++) {
            if (grades[i] > maxGrade) {
                maxGrade = grades[i];
            }
        }
        System.out.println("Highest grade in the class: " + maxGrade);
    }
}
```

- a) Justify the use of Scanner in the program above
- b) Identify two Java fundamentals used in this program.

(1 Mark)

(2 Marks)

- c) Explain the use of an array for storing student grades instead of individual variables. **(2 Marks)**
- d) Identify and briefly explain the loop used in the program to take user input **(2 Mark)**
- e) Explain the purpose of the if statement in finding the highest grade **(2 Marks)**
- f) State the purpose of the switch case in the program **(1 Mark)**

SECTION B

(Answer any FOUR (3) questions in this section)

QUESTION 2

Use the program below to answer the questions that follow:

```
import java.util.Scanner;
public class EmployeeSalary {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        double[] salaries = new double[3];
        for (int i = 0; i < salaries.length; i++) {
            System.out.print("Enter salary for Employee " + (i + 1) + ": ");
            salaries[i] = scanner.nextDouble();
        }
        double totalSalary = 0;
        for (double salary : salaries) {
            totalSalary += salary; // Addition operator
        }
        double averageSalary = totalSalary / salaries.length; // Division operator
        double highestSalary = salaries[0];
        for (int i = 1; i < salaries.length; i++) {
            if (salaries[i] > highestSalary) { // Relational operator
                highestSalary = salaries[i]; // Assignment operator
            }
        }
        System.out.println("Total Salary: " + totalSalary);
        System.out.println("Average Salary: " + averageSalary);
        System.out.println("Highest Salary: " + highestSalary);
    }
}
```

- a) Identify and explain the purpose of three types of operators used in this program **(3 Marks)**
- b) Justify the use of an array to store employee salaries instead of individual variables **(3 Marks)**

- c) Describe how the above program uses loops and conditions to find the highest salary
(4 Marks)

QUESTION 3

Use the program below to answer the questions that follow:

```
import java.util.Scanner;
class Student {
    private String name;
    private int age;
    private double grade;
    public Student(String name, int age, double grade) {
        this.name = name;
        this.age = age;
        this.grade = grade;
    }
    public void displayStudentInfo() {
        System.out.println("Student Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Grade: " + grade);
    }
    public boolean hasPassed() {
        return grade >= 50.0; // Returns true if grade is 50 or above
    }
}
public class StudentManagement {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter student name: ");
        String name = scanner.nextLine();
        System.out.print("Enter student age: ");
        int age = scanner.nextInt();
        System.out.print("Enter student grade: ");
        double grade = scanner.nextDouble();
        Student student = new Student(name, age, grade);
        student.displayStudentInfo();
        if (student.hasPassed()) {
            System.out.println(name + " has passed.");
        } else {
            System.out.println(name + " has failed.");
        }
    }
}
```

- a) Explain the role of the Student class in this program. **(3 Marks)**
- b) Describe how an object of the Student class is created and used in the main method. **(3 Marks)**
- c) Describe the purpose of the *hasPassed* method and indicate how its return value affect program execution. **(4 Marks)**

QUESTION 4

- a) Write a program that reads in the radius and length of a cylinder and computes its volume using the following formulas: **(5 marks)**
$$\text{area} = \text{radius} * \text{radius} * \pi$$
$$\text{volume} = \text{area} * \text{length}$$
- b) DigitalLife Restaurant wants to automate its Entrance Management System. You have been approached to write a simple program to determine whether the potential client is under age or an adult and give appropriate advice. Write down the probable code that you would provide using conditional control structures. **(5 Marks)**

QUESTION 5

Use the program below to answer the questions that follow:

```
import java.util.Scanner;
public class BankAccount {
    private double balance;
    public BankAccount(double initialBalance) {
        this.balance = initialBalance;
    }
    public void deposit(double amount) {
        if (amount > 0) {
            balance += amount; // Adds amount to balance
            System.out.println("Deposited: " + amount);
        } else {
            System.out.println("Invalid deposit amount!");
        }
    }
    public boolean withdraw(double amount) {
        if (amount > 0 && amount <= balance) {
            balance -= amount; // Deducts amount from balance
            System.out.println("Withdrawn: " + amount);
            return true;
        } else {
            System.out.println("Invalid or insufficient funds!");
            return false;
        }
    }
}
```

```
    }  
}  
public double getBalance() {  
    return balance;  
}  
public static void main(String[] args) {  
    Scanner scanner = new Scanner(System.in);  
    BankAccount account = new BankAccount(1000.0);  
    System.out.print("Enter amount to deposit: ");  
    double depositAmount = scanner.nextDouble();  
    account.deposit(depositAmount);  
    System.out.print("Enter amount to withdraw: ");  
    double withdrawAmount = scanner.nextDouble();  
    account.withdraw(withdrawAmount);  
    System.out.println("Final Balance: " + account.getBalance());  
}  
}
```

- a) Describe three methods used in this program, explaining their purpose.
(3 Marks)
- b) Explain the significance of the return type for the withdraw and getBalance methods.
(3 Marks)
- c) Describe how the deposit and withdraw methods are used in the main method to update the account balance.
(4 Marks)

QUESTION 6

Assume there is a Book class with a method setDetails(String title, String author, String isbn).

- a) Write Java code to create a Book object called myBook and set its details to: title="Java Basics", author="Alex Green", isbn="12345".
(5 marks)
- b) Write the Java class Book with Two instance variables: title and author (both String); constructor to initialize both variables and a method displayDetails() that prints the book's title and author.
(5 marks)

EOF