

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical & Computer Engineering



Study Programme	: Bachelor of Software Engineering Honours
Name of the Examination	: Final Examination
Course Code and Title	: EEI3262 Introduction to Object Oriented Programming
Academic Year	: 2023/24
Date	: 28 th January 2025
Time	: 0930-1230 hrs
Duration	: 03 hours

General Instructions

1. Read all the instructions carefully before answering the questions.
 2. This question paper consists of **Four (04)** questions in **Three (03)** pages.
 3. Answer all questions.
 4. Answer for each question should commence from a new page.
 5. This is a Closed Book Test (CBT).
 7. Answers should be in clear handwriting.
 8. Do not use red colour pen or pencil.
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Q1 [40 Marks]

You are supposed to develop a Healthcare Management System (HMS) using the Java programming language. The system involves different types of users, such as doctors, nurses, and patients. Each user has a name, NIC, and contact number. Doctors have additional properties such as specialization and consultation fees. Nurses have additional properties such as shift type (e.g., Day or Night) and assigned department. Patients have additional properties such as diagnosis (a brief description) and assigned doctor. The system allows Doctors to view their list of assigned patients. Nurses to check their assigned department. Patients to view their assigned doctor's details.

As a Software Architect of the HMS project, answer the questions given below.

- a) Briefly explain the following terms in Object Oriented Programming.
 - i) Method overloading
 - ii) Interface
 - iii) Access modifiers
 - iv) Encapsulation

[08 Marks]
- b) Identify the list below from the HMS project description above.
 - i) Name of the parent class.
 - ii) Common attributes shared by all subclasses.
 - iii) Methods that can be created in each subclass.

[12 Marks]
- c) Below mentioned Java code was written by one of the developers. The Java code of the 'User' class was created based on the HMS project.

```
class User {  
    String name;  
    String NIC;  
    String contactNumber;  
  
    public void performRole() {  
        System.out.println("Performing a general user role.");  
    }  
}
```

- i) Would making this class abstract be correct? Justify your answer.

[05 Marks]
- ii) Write the complete Java Code for the "Doctor" subclass. (Include a constructor that initializes all the attributes and the method-overriding for the performRole() method with a suitable body.)

[15 Marks]

Q2 [20 Marks]

- a) What is the difference between a 'Class' and an 'Object' in Object-Oriented Programming? [04 Marks]
- b) Consider the following set of words. Categorize them as either 'method' or 'attribute'. (Speed, Fly, Height, CalculateArea, Color, Run) [06 Marks]
- c) Create two methods, one that takes two double values as parameters and returns their product, and the other method takes three double values as parameters and returns their product. Use the method overloading concept. Then write how you would call these two methods. *(No need to write the complete program. Only write the two methods.)* [10 Marks]

Q3 [20 Marks]

- a) What will be the output if these five Java variables are printed.
 - i) `int a = -5 + 8 * 6;`
 - ii) `double b = (55-9.5) % 9;`
 - iii) `int c = 5 + 15 / 3 * 2 + 8 % 3;`
 - iv) `double d = 5.5 + 11 / 3 * 2 - 5.5 % 5.5;`
 - v) `int e = -1+1-1+1-1+0+1;` [10 Marks]
- b) You are working on a Banking System where you need to manage BankAccount objects. Each BankAccount class will store the account holder's information such as accountNumber, accountHolderName, and balance. The balance should be kept private to ensure that no one can modify it directly. Instead, the system should allow controlled access to the balance using getter and setter methods. The following Java code is incomplete. Fill in the blanks with the correct OOP terms and methods and Java syntax. *(Write only the answers needed for the blanks in your answer script. Don't write on this paper.)*

```
public class _____(i) {
    private String accountNumber;
    private String accountHolderName;
    private double _____(ii);

    public _____(iii) (String accountNumber, String
accountHolderName, double balance) {
        this.accountNumber = accountNumber;
        this.accountHolderName = accountHolderName;
        this._____(iv) = balance;
    }

    public double _____(v) () {
        return _____(vi);
    }

    public void setBalance (double newBalance) {
        if (newBalance >= 0) {
            this._____(vii) = newBalance;
        } else {
```

```

        System.out.println("Invalid balance amount.");
    }

    public void deposit (double amount) {
        if (amount > 0) {
            this._____ (viii) += amount;
        } else {
            System.out.println("Deposit amount must be
positive.");
        }
    }

    public void _____ (ix) (double amount) {
        if ( _____ (x) > 0 && amount <= this.balance ) {
            this.balance -= amount;
        } else {
            System.out.println("Invalid withdrawal amount.");
        }
    }
}

```

[10 Marks]

Q4 [20 Marks]

- a) What is an Exception? [02 Marks]
- b) Define the following.
 - i) Syntax Error
 - ii) Logical Error
 - iii) Runtime Error [06 Marks]
- c) Consider the following Java code and answer the questions below.

```

import java.util.Scanner;
class Main {
    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);
        double a = sc.nextDouble();
        int b = sc.nextInt() ;

        double div = a/b;
        System.out.println(div);
    }
}

```

- i) Identify the potential mathematical runtime exception that this Java code might generate and provide a brief explanation of the circumstances under which it occurs. [04 Marks]
- ii) Rewrite the Java code with the exception handled. *(Need to write only the part that is inside the main method.)* [08 Marks]

END
