THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. (IT) DEGREE PROGRAMME
LEVEL 04

COU4300 – Object Oriented Programming

Final Examination Paper: 2024/2025

Duration: Two hours only (02 hours)

Date: 14.06.2025 **Time: 9.30 am – 11.30 am**

INSTRUCTIONS TO CANDIDATES

- This paper contains **Six (06)** questions and **Five (05)** pages.
- **Duration** of the examination is **two (02)** hours.
- **Question One (01) is compulsory and must be answered by all candidates.**
- In addition to Question one (01), answer **any three (03)** questions from **Questions Two (02) to Six (06).**
- Write your **index number** clearly on the **cover of the answer book** and on **all extra sheets used.**
- Clearly indicate the **question numbers** you are attempting in your answer script.
- **Begin** each answer on a **new page.**
- All answers **must be written in English.**
- Clearly state any assumptions made.
- **Do not use red pens.** Only **blue** or **black** pens are allowed for writing answers.
- Securely attach all additional sheets to your main answer script before submission.
- **This is a closed-book examination. No reference materials, textbooks, or electronic devices are allowed.**
- Candidates are reminded to maintain **academic integrity**. Any form of **cheating or misconduct will result in disciplinary action.**

Question 01 – Compulsory (40 marks)

1) What is meant by a "**class**" in Object-Oriented Programming? Give an example. **(05 marks)**

2) What is known as a **"method"** and write the **syntax** for a method. **(05 marks)**

3) List **four (04)** access modifiers available in Java and **describe** their accessibility based on **four criteria**. **(08 marks)**

4) Fill in the blanks to create a valid program that **takes a String input**.

```
(a)  java.util.Scanner;

class Test {
    public static void main(String[ ] args) {
        Scanner sc = new (b)(System.in);
        (c) nick = sc.(d)();
    }
}
```

(04 Marks)

5) How is an object different from a class? State **two (02)** reasons. **(04 Marks)**

6) What is a constructor? Name the types of constructors in Java. **(04 Marks)**

7) Write the **output** of the following code:

```
public class Main {
    public static void main(String[] args) {
        int x = 5;
        System.out.println(x++ + ++x);
    }
}
```

(03 Marks)

8) Which keyword is used to create a **constant variable**? **(02 Marks)**

9) What will be the **output** of this code?

```
public class Main {
    public static void main(String[] args) {
        String s = "Hello";
        System.out.println(s.length());
    }
}
```

(03 Marks)

10) What is the default value of a **Boolean variable** in Java? **(02 Marks)**

Question 02 – (20 marks)

1) What is the purpose of **instance variables** and **local variables**? Give two (02) points **for each**. **(02 Marks)**

2) Can a constructor **be static** or **have a return type**? Explain your answer in brief. **(05 Marks)**

3) Write a **Java class** named **Book** with attributes *title*, *author*, and *price*.
   - A **default constructor** that initializes values with placeholders (e.g., "Unknown") and a **parameterized constructor** to assign custom values
   - A method ***displayBookInfo()*** to **print** book details **(08 Marks)**

4) Create **two objects** using **both constructors** and **display** their information using the ***displayBookInfo()*** method. **(05 Marks)**

Question 03 - (20 marks)

1) What is **inheritance**? Explain with an example. **(03 Marks)**

2) What is the **IS-A relationship** in Java? **(02 Marks)**

3) Name **all** the types of inheritance and **state** which of them are **supported** in Java. **(04 Marks)**

4) Implement a class **Employee** with attributes ***name*** and ***paymentPerHour***, an appropriate **constructor**, and a method ***calculateSalary()***. **(05 Marks)**

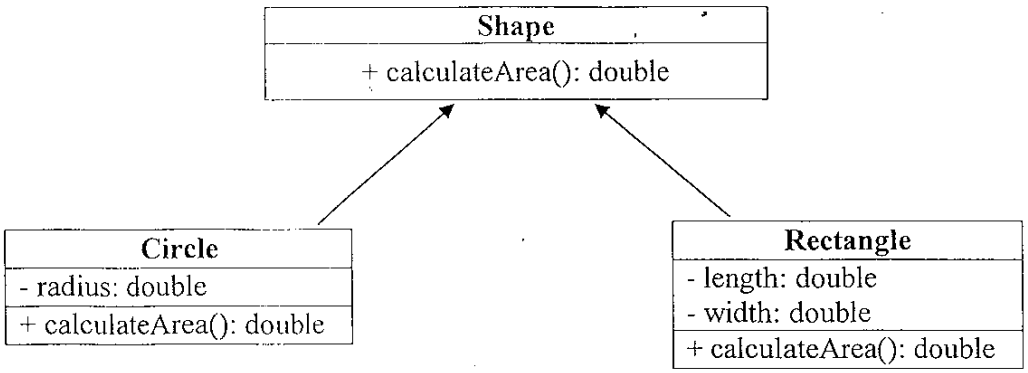
5) Implement a subclass **PartTimeEmployee**, with an additional attribute ***workedHours***, and override the ***calculateSalary()*** (salary = worked hours * payment per hour) **(06 Marks)**

Question 04 - (20 marks)

1) What is **abstraction** in Java? List **three (03)** properties of abstract classes. **(05 Marks)**

2) How does an interface differ from an abstract class? State **three (03)** points. **(03 Marks)**

Use the diagram below for the 3rd and 4th Questions:



3) Create an abstract class **Shape** with one abstract method ***calculateArea()***. **(04 marks)**

4) Implement the subclasses **Circle** and **Rectangle**, each with the correct formula for ***calculateArea()***. Use the formula below to calculate area.

Area of circle = 3.14 * radius * radius

Area of rectangle = length * width **(08 Marks)**

Question 05 - (20 marks)

1) Define **polymorphism**. State **two (02)** reasons why it supports **flexible programming**. **(04 Marks)**

2) Differentiate between **method overloading** and **method overriding** by stating **two (02)** differences and providing one (01) example **for each**. **(04 Marks)**

3) Explain the difference between **compile-time polymorphism** and **runtime polymorphism.** **(04 Marks)**

4) Write a class **Display** with overloaded ***show()*** methods to handle the following:

- Showing a **single character**
- Showing a **string**
- Showing a **string** and a **number** together **(08 Marks)**

Question 06 - (20 marks)

1) Briefly explain the concept of encapsulation. **(04 Marks)**

2) Identify **four (04)** advantages of using encapsulation. **(04 Marks)**

3) What is the relationship between **encapsulation** and **data hiding**? State **two (02)** reasons. **(04 Marks)**

4) Implement a class Student.

- Include **constructor**, **getter**, and **setter** methods.
- Create an **object** and **display** the details.

Refer to the class structure below: **(08 Marks)**

Student
- name: String - grade: String

********** END OF THE PAPER **********