The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc./ B. Ed Degree Programme

Department	: Computer Science
Level	: 04
Name of the Examination	: Final Exam
Course Title and - Code	: CSU4616 - OBJECT ORIENTED PROGRAMMING
Academic Year	: 2023/2024
Date	: 10.10.2023
Time	: 01.30 p.m. – 04.30 p.m.
Duration	: Three hours only

General Instructions

1. Read all instructions carefully before answering the questions.

2. This question paper consists of **(06)** questions in **(04)** pages.

3. **Answer Four(04) questions only**, in the provided answer book.

4. Answer for each question should commence from a **new page.**

5. Involvement in any activity that is considered as an exam offence will lead to punishment

7. Use **blue or black ink** to answer the questions.

8. Clearly state your **Index Number** for B.Sc/B.Ed Degree Programme in your answer script

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Question 1

    a. State two (2) reasons for selecting Object Oriented Programming (OOP) rather than conventional programming? (3 Marks)

    b. Explain the terms **object and class** with an example. (5 Marks)

    c. Write a function in c++ to find the summation of the given set of numbers below.

    Set of 10 numbers = (05, 10, 13, 21, 01, 24, 31, 57, 28, 16) (06 Marks)

  d. State whether the following statements are TRUE or FALSE in JAVA,

if it is FALSE,correct it by mentioning the reason. (04 x 02 = 08 marks)

i)**const int PI= 3.14159;** is a valid final variable declaration.

ii)**int [][] array2= [[31,15], [45,68]];** is a valid declaration of array.

iii)**Private int x=1.9;** is a valid variable declaration

iv)**public static void product (int x , y){**

return x*y;

}

is a valid method declaration

d. Write 2 differences between Java and c++?   (3 Marks)

Question 2

a. What is inheritance, explain by giving a suitable example ?   (04 marks)

b. The University maintains a database to store the details of **staff** . The database stores

the details such as Name, Age, NIC, address of both **academic staff** and **non-**

academic staff. There is a category of **permanent academic staff** and **temporary**

academic staff in academic staff.

i) Write a complete Java class for Staff consisting academic staff and non-academic

staff, permanent academic staff and temporary academic staff classes(Additional

variables, constructors, methods can be used if necessary).   (07 marks)

ii) Define suitable methods for overloading   (03 marks)

iii) Define suitable methods for overriding   (03 marks)

c. Explain the difference between **final class** and **normal class**   (04 marks)

e. Explain the platform independence related to JAVA language.   (04 marks)

Question 3

a. What is the difference between **overloading** and **overriding**? (06 marks)

b. How can you achieve **overloading** in your OOP? (3 Marks)

c. Explain the concept of multi-threaded programming in your own words. (06 marks)

d. Write the syntax for the following sentences in c++ (05 x 02 = 10 marks)

     i)Create an instance for class Vehicle.

     ii)Declare a final variable x.

     iii)Declare an interface Bike with a method ride.

     iv)Declare an abstract class Animal with abstract method eat()

     v)class Course implements the Interface learning.

Question 4

a. Compare and contrast **class variables** and **instance variables**. (4 Marks)

b. What do you understand by "constructors", explain with its types? (06 marks)

c. Differentiate **abstraction and encapsulation**. (4 Marks)

d. Write a Java application program to calculate the gross salary paid for an Employee of an institution. This Java program should have super class **Employee** and two subclasses **Manager** and **Labour.** Each Employee has Name, Employee Number, position, Basic salary as attributes. This java program should calculate the gross salary received by each Employee. (11 marks)

Superclass Employee has a method,

calculateSalary()-method to calculate salary of Employee

Subclasses Manager and Labour overrides superclass calculateSalary() method, with percentages of bonus 30%, 05% of their basic salary respectively.

Implement necessary classes with appropriate constructors, implement methods, ensuring appropriate inheritance, overriding. In the main class **Employee**, create instances for 2 different employees, initialise the attributes, display salary paid.

Employee1: Perera, E001, Trainee Assistant, 45000

Manager1: Ravi, E002, Manager, 85000

Labour1: Hemal, E003, Labour, 35000

Question 5

a. Differentiate **abstract class** and **normal class** (04 marks)

b. class Shape is an abstract class. draw() is an abstract method found inside abstract class Shape. class Rectangle and class Hexagon are subclasses for abstract class Shape.

   i) Write a complete Java class to implement this scenario.(Additional variables, constructors, methods can be used if necessary). (06 marks)

   ii) Define suitable methods for overloading (04 marks)

   iii) Define suitable methods for overriding (04 marks)

c. Explain the process of converting a JAVA source code into machine language. (04 marks)

d. What are the 2 types of inheritance supported by c++? (03 marks)

Question 6

a. State three (3) features of Java? (03 Marks)

b. Compare and contrast **methods and constructors**. (06 Marks)

c. Differentiate **class method and instance method.** (04 Marks)

d. Draw the flow diagram of runnable, blocked, running states in brief.(08 marks)

f. Explain garbage collection by giving 2 situations. (04 marks)

** End of the Paper**