

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	: CSU4301- OBJECT ORIENTED PROGRAMMING
Academic Year	: 2023/2024
Date	: 10.10.2023
Time	: 01.30 p.m. – 03.30 p.m.
Duration	: Two 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 any four(04) questions, 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 offense 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

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. (6 Marks)
- c. Write a function in Java 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) (6 Marks)
- d. State whether the following statements is TRUE or FALSE, if it is FALSE, correct it by mentioning the reason. (05 x 02 = 10 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.

v) `abstract class Animal{ }`

is a valid abstract class declaration.

Question 2

- a. What is inheritance, explain by giving a suitable example ? (6 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). (5 marks)
- ii) Define suitable methods for overloading (3 marks)
- iii) Define suitable methods for overriding (3 marks)
- c. Explain the difference between **final class** and **normal class** (4 marks)
- d. What do you understand by the word "Garbage collection" process in programming? (4 marks)

Question 3

- a. What is the difference between **overloading** and **overriding**? (6 marks)
- b. How can you achieve **overloading** in OOP? (3 Marks)
- c. Explain the concept of **multi threaded programming** in your own words. (6 marks)
- d. Write the syntax for the following sentences in JAVA (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. What do you understand by “**constructors**”, explain with its types? (5 marks)
- b. Compare and contrast **class variables** and **instance variables**. (3 Marks)
- c. Differentiate **abstraction and encapsulation**. (3 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 staff member. (14 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, initialize 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 (4 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). (7 marks)
- ii) Define suitable methods for overloading (4 marks)
- iii) Define suitable methods for overriding (4 marks)
- c. Explain the process of converting a JAVA source code into machine language. (6 marks)

Question 6

- a. State three (3) features of Java? (3 Marks)
- b. Compare and contrast **methods and constructors**. (6 Marks)
- c. Differentiate **class method and instance method**. (4 Marks)
- d. Draw the flow diagram of runnable, blocked, running states in brief. (8 marks)
- e. Explain garbage collection by giving 2 situations. (4 marks)

**** End of the Paper****