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

075

Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	**:** EEX3262 Introduction to Object Oriented Programming
Academic Year	: 2021 - 22
Date	: 17th February 2023
Time	: 09:30-12:30hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. Answers should be written in answer book provided. Answer for each question should commence from a new page.
3. This question paper consists of Four (04) questions in Six (06) pages.
4. Answer **ALL** questions.
5. This is a Closed Book Test (CBT).
6. Answers should be in clear handwriting.
7. Do not use red colour pen.

Question 1

State whether the following statements are **True** or **False**. Clearly explain why the statement is true or false.

(Note: Answers without the correct explanation will not score any marks)

(a) In Java, variable names can begin with any character.

(b) Java classes can have only a single constructor.

(c) The **break** statement in java allows the program to execute the next iteration of a loop based on a condition.

(d) In Java, a class is a collection of all the objects of the same type created during the execution of the program.

(e) Java interfaces can have both abstract methods that does not have an implementation and methods that have an implementation.

(f) The final keyword in Java can be used to define an abstract method in a class.

(g) In Java, method overloading refers to redefining methods defined in a superclass by a subclass.

(h) In Java, a method defined as private in a super class can be overridden by any of its subclasses.

(i) The private access modifier in Java allows a class to be accessed by any class in the same package.

(j) The statement

```
Class MyClass extends SuperClass1, SuperClass2 { }
```

is a valid statement that defines a class with multiple inheritance.

(2.5 x 10 = 25 Marks)

Question 2

(a) Explain how Java programming language achieve Platform Independence?

(4 Marks)

(b) Explain, using suitable examples, how polymorphism is implemented in Java.

(4 Marks)

(c) What is the output of the following Java code segments? Explain how you reached the answer.
(Note: Answers without correct explanations will not score any marks)

(i)
```
int numbers[] = {1,2,3,4,5,6,7,8,9};
int i=0, sum=0;
while (numbers[i] < 6) {
        sum += numbers[i];
        i += 2; }
System.out.println(sum);
```

(ii)
```
int k = 6;
int i = k * 1 / 3;
switch (i) {
        case 1: k= 0;
        case 2: k= 1;
        default: k= 2; }
System.out.println (k);
```

(2 x 4 = 8 Marks)

(d) What is Code Refactoring in Java? What are the main advantages of refactoring?
(3 Marks)

(e) Consider the following code segments and apply techniques for code refactoring where applicable. Your answer should include an explanation of why you considered refactoring is necessary.

(i)
```
public int calculateSum(int a, int b, int c) {
  int sum = 0;
  sum += a;
  sum += b;
  sum += c;
  return sum;
}
```

(ii)

```
class Customer {
        private String name;
        public void getCustomerName(Customer customer) {
                String newName = this.name;
                return newName;
        }
}
```

(2 x 3 = 6 Marks)

Question 3

A software company called "The Software Company" wishes to develop a project management software system that allows project managers to track the progress of various projects. The application needs to store project title and a list of tasks associated with each project. Each task will have a description and the expected duration in hours.
Each project manager will handle only one project at any given time.

The company has hired you to create a Java application that implements this functionality. Your application should have the following features:

- A Project class that stores information about each project, including its title, and a list of tasks that need to be carried out in the project.
- A Task class that stores the name, and the amount of time in hours it takes to complete each task.
- A Project Manager class that allows project managers to create a project, add tasks to projects, and track the progress of the project. The project manager should be able to view the details of a specific project and generate reports on the progress of each project. A project manager will handle only one project at a time.

The Java application should be robust and scalable, well-documented and easy to use, so that other developers can continue to maintain and extend the application as needed. It should also follow the principle of information hiding.

Carry out the following tasks:

(a) Create a class called **Project** with the following characteristics:

- Have an attribute called **companyName** that stores the name of the company that is a constant value common to all objects and can be accessed without creating an instance of the Project class.
- It should be possible to create a project by giving a project name or create project with the name "Untitled" if no name is given. .
- Should have a suitable data structure to store the tasks related to the project.
- Should have the following methods:
    - A method called **showDetails** that will display the information about the tasks related to the project.
    - A method called **addTask** that can add a new task to the project.

(12 Marks)

(b) Define a class called **Task** with the following characteristics.

- A new task object is created by giving the task name and its duration in hours.

(4 Marks)

(c) Define a class called **ProjectManager** with a main method that

- Displays the Company Name
- Creates a new Project
- Creates the following tasks and add them to the new Project
    - "Requirement Analysis" with a duration of 30 hours
    - "Design" with a Duration of 40 hours
    - "Testing" with a duration of 10 hours
- Display the project details.

(9 Marks)

Question 4

(a) Consider the following code segment that includes placeholders for several tasks that should be completed.

```
public class MyArrays{
        // Task 1: Define a method called findMax
        public static void main(String argos[]) {
                int[] myIntArray = {23, 34, 75, 12, 89, 76}
                // Task 2: call the findMax method and assign the value to
        maxArray
                 // Task 3: Print the values of the array and the Maximum
        value
        }
}
```

(i) Define a method called **findMax** that takes an array of integers as the argument and returns the maximum value of the array.

(7 Marks)

(ii) Declare an integer value called **maxValue**. Call the function findMax and assign the returned value to maxValue

(3 Marks)

(iii) Print the values of the array and the maximum value of the array with appropriate messages.

(3 Marks)

(b) Describe the role of each of the following keywords in Java and give examples of their use.

(i) this

(ii) super

(iii) static

(iv) implements

(3 x 4 = 12 Marks)

END OF PAPER