

Diploma in Software Engineering 231F – Final Exam

01st November 2023, 09:00 am - 12:00 pm

Object Oriented Programming

Time allowed: Two hours

INSTRUCTIONS TO CANDIDATES

- This paper contains 5 questions.
- Marks for each question is indicated.
- This is a closed book examination.
- All calculators are not allowed.
- Answer ALL questions.

ADDITIONAL MATERIALS

- None

QUESTION 1-20 Marks

- a) Differentiate overloading and overriding in OOP. **(4 Marks)**.
- b) What is the task of constructors and define types of constructions. **(4 marks)**.
- c) What are the four types of access modifier/Visibility modes of class members? **(4 marks)**
- d) Differentiate IS-A and HAS-A relationship **(4 Marks)**.
- e) What is the use of abstract feature in OOP? And what are the changes could occur when made classes, methods and variables as abstract? **(4 Marks)**.

QUESTION 2-20 Marks

- a) What are three types of variables based on the scope? **(3 marks)**
- b) What is the output of the following program?
Explain your observations. (3 Marks)
class Student {
 private String name;
 public Student(String name){
 name=name;

```

    }
    public void display(){
        System.out.println(" Name is "+name);
    }
}
public class driverClass {
    public static void main (String args []) {
        Student s1=new Student("Amal");
        Student s2=new Student();
        s1.display();
    }
}

```

- c) ABC company is required to develop a system to store their employee details and calculate the salaries according given details below. (15 marks)

The system should store name, job title, age, basic salary and net salary.

Use constructor/s to set the data for an employee according to the given properties of employee.

Update the net salary of the employee using a separate method according the tax table given below.

Display employee details using a separate method. (write main method in a separate class)

Category	tax percentage
Basic Salary above 300000	36 %
Basic Salary above 200000	20 %
Basic Salary above 100000	10 %

QUESTION 3-20 Marks

- a) Define the term final using a variable, method and a class (5 marks)
- b) Winworld is a private company which has number of branches in each country to serve the main city. A branch is associated with a main city and branch has attributes of branch number, branch name and main city name currently being treated. City has attributes of city code and name.
 - a. Write an object-oriented application to perform following tasks.

You are required to identify classes, relationships between classes and use appropriate functions to write the program.

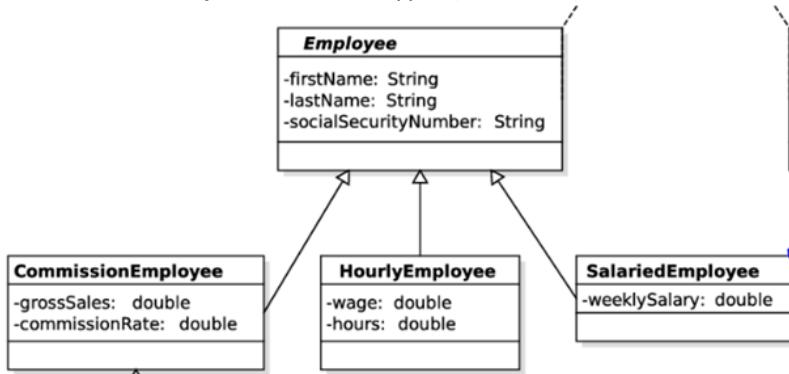
Set data for City (city code and name) using parameterized constructor.

Set data for the Branch (branch Number, branch Name, main city name) using parameterized constructor.

Write a method to display the details of a branch including the main city. (15 Marks)

QUESTION 4-20 Marks

- 1) List out benefits of inheritance in object-oriented programming. **(3 marks)**
- 2) A student registers for a course in computer science and it belongs to the certificate category. The Institute keeps all certificate students as a sub category of student. Write a program to show the inheritance of above details and show a one variable with suitable access to access through inheritance. (note: no main method or other methods are required). **(5 marks)**
- 3) Implement the below using inheritance and use setters and getters to set the data and display data.
- 4) Create at least one object from each type. **(12 Marks)**



QUESTION 5-20 Marks

What is the advantage of the term supper in OOP? **(2 marks)**

MultiCars is a Rent A car company which provides cars for any occasions. There is a system which calculates the total bill amount for each rented car. For each rental there is a customer Number, car Number, rent per day, number of days and use a **calculateTotal()** member method to calculate total bill amount.

Total = rent per day * number of days

Further, there is a special type of package “**WeddingHire**” to rent for customers for their wedding , where each customer can add their own decorations to the rented car. There is an additional service charge for the package **Weddinghire**. Use a **calculateTotal()** member method to calculate the total.

Total = rent per day * number of days + Service charge

Write an Object-Oriented program which performs the following operations. You are required to identify super class, sub class, data members, and methods. Create an object of **Weddinghire**. Use appropriate functions to write the program.

- a. Use **setData()** method to set the values for data members.
- b. Use **calculateTotal()** method to calculate Total bill amount.
- c. Use **displayData()** method to print the Total **(18 marks)**