



هنز الزينة

Object Oriented Programming :المادة

المرحلة: الاجازة

المدة: 90 دقيقة

السنة المنهجية: الاولى- الدورة الاولى

الأستاذ: د. يوسف الاتات

الاختصاص: علم البيانات

Question 1 - Theoretical Questions (4 pts)

1. Define the following concepts:

- a) Class
- b) Object
- c) Encapsulation
- d) Inheritance

2. What is the difference between:

- a) an abstract class and an interface?
- b) == and .equals() in Java?

Question 2 - Code Analysis (4 pts)

Consider the following program:

```
class Animal {  
    public void sound() {  
        System.out.println("Animal sound");  
    }  
}
```

```
class Dog extends Animal {  
    @Override  
    public void sound() {  
        System.out.println("Dog barks");  
    }  
}
```

```
public class Test {  
    public static void main(String[] args) {  
        Animal a = new Dog();  
        a.sound();  
    }  
}
```

Questions:

1. What will be the output of the program?
2. Which OOP concept is illustrated in:
Animal a = new Dog();
3. What is the role of @Override?

4. What would happen if the sound() method did not exist in Animal?

Question 3 - Classes and Objects (5 pts)

We want to manage students.

1. Create a class Student containing:

- id
- name
- average

2. Add:

- A constructor
- getters/setters
- A display() method

3. Write a class TestStudent allowing:

- Creation of 3 students
- Storing them in an array
- Displaying only students whose average is greater than or equal to 10.

Question 4 - Inheritance and Polymorphism (4 pts)

Consider the following class:

```
class Vehicle {  
    protected String brand;  
  
    public Vehicle(String brand) {  
        this.brand = brand;  
    }  
  
    public void display() {  
        System.out.println("Brand : " + brand);  
    }  
}
```

Required work:

1. Create a class Car inheriting from Vehicle and containing:

- numberOfDoors

2. Redefine the display() method to show all information.

3. Create a class Motorcycle containing:

- engineCapacity

4. In main, create an array of Vehicle containing cars and motorcycles, then display their information.

Question 5 - Exception Handling (3 pts)

1. Write a program that:

- asks the user for two numbers
- performs a division
- handles division by zero using try-catch

2. What is the difference between:

ArrayList<Student>

and

Student[] ?