# 433 - 254 Software Design

Section A – Multiple Choice (This sample paper has less questions than the exam paper The exam paper will have 25 Multiple Choice questions.)

1 . Which of the following statements is true:

    A) Java doesn't support inheritance
    B) Java supports multiple inheritance
    C) Java supports interfaces
    D) Java supports polymorphism
    E) C and D

2. The following diagram indicates:
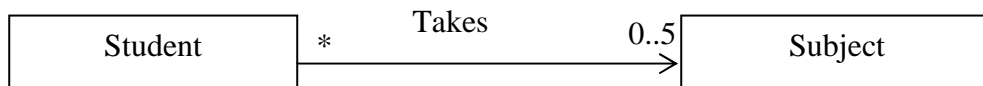
    A) A student can take exactly 5 subjects
    B) A student can take zero or up to 5 subjects
    C) A subject can be taken by zero or up to 5 students
    D) A subject can be taken by 0 or more students
    E) B and D

3. Consider the following method:
```
public void myfunc()
{
    static int a = 20;
    System.out.println(a++);
}
```
the value printed by the myfunc() method during its 2nd invocation is:
    A) 20;
    B) 21
    C) 22
    D) 19
    E) None of the Above

4. What is the most expensive phase in a software development life cycle?

   A) Design
   B) Maintenance
   C) Implementation
   D) Analysis
   E) Testing

5. Which if the following belong to UML behavioral diagrams:
   A) Cass and object diagram
   B) Use case diagram and sequence diagram
   C) Collaboration diagram and state-char diagram
   D) A and B
   E) B and C

6. What will the main method of the following Java class E print?

```
class C {
        public int x = 1;
        public C(int i) { x += i; }
}
class D extends C {
        public D(int i) { super(i); x += i; }
}
class E {
        public static void main(String argv[]) {
        C ar[] = new C[2];
        ar[0] = new C(1);
        ar[1] = new D(2);
        System.out.println(ar[0].x + ar[1].x);
        }
}
```

   A) 2
   B) 3
   C) 5
   D) 7
   E) this program will not compile

7. Which of the following is a valid method to indicate comments in Java?

   A) // comment to end of line
   B) /* comment */
   C) # comment to end of line
   D) A and B
   E) A and C

8. What keyword is used in Java to define a constant?

   A) static
   B) final
   C) abstract
   D) public
   E) private

9. Which of the following UML diagrams is part of UML structural diagram?

   A) Class diagram
   B) Sequence Diagram
   C) Object Diagram
   D) A and B
   E) A and C

10. A polymorphic operation:

   A) is one which is grouped together with the datatype it operates on
   B) can operate on different sorts of data
   C) must inherit its implementation from another class
   D) A and C
   E) B and C

Sample Paper

Section B – Short Answer

1. Name five standard packages supported by Java and discuss them briefly.

2. Companies may employ many people, and people may work for many companies. Every employee in a company has a manager who may manage many subordinate employees. Show the relationship between the Employee and Company class in UML.

3. What is sequence diagram? When is it appropriate to use this diagram?

4. Explain the meaning of the following terms.
   (a) method overloading
   (b) Method overriding
   (c) Abstract Class

5. Class A implements the interface B. Represent this in UML. How would you implement this relationship in Java?

6. What are exceptions? Discuss briefly with a suitable example.

Sample Paper

Section C – Long Answer

1. 20 integers are stored in an array intNumbers[ ]. Write a Java application that determines and prints the number of odd, even and zero digits in the array.

2. Implement an abstract class named Person and two subclasses named Student and Employee in Java. A person has a name, address, phone number and e-mail address. A student has a class status (freshman, sophomore, junior or senior). Define the status as a constant. An employee has an office, salary and date-hired. Implement the above classes in Java. Provide Constructors for classes to initialize private variables. Override the toString method in each class to display the class name and the person's name. Write an application to create objects of type Student and Employee and print the person's name and the class name of the objects.

3. Draw a UML user case diagram and class-diagram for a partial specification of the system described below. Include as much relevant detail from the description as possible on the diagram, including attributes, associations (where possible, use formal notation for describing these) and operations. Details such as type and range of attributes and arguments of operations are not required.

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