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CICT PART II SECTION 4

OBJECT ORIENTED PROGRAMMING

FRIDAY: 27 November 2020.

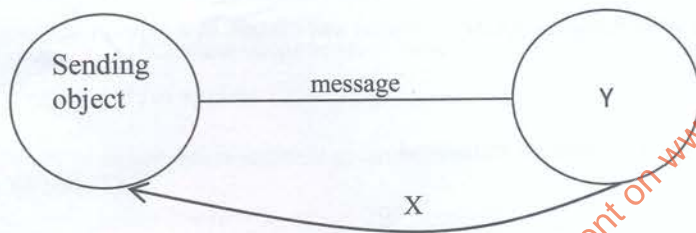
Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

ALL programs written should be in Java object oriented programming language.

QUESTION ONE

- (a) Explain four weaknesses of object oriented programming. (4 marks)
- (b) The figure below represents message passing in object oriented programming:



Required:

- (i) Name the parts labelled X and Y. (2 marks)
- (ii) Enumerate four components of the part labelled "message". (4 marks)
- (c) Tabulate four differences between a recursive function and looping as used in object oriented programming. (8 marks)
- (d) State an example of each of the following data types as used in Java programming language:
 - (i) Primitive data type. (1 mark)
 - (ii) Composite data type. (1 mark)

(Total: 20 marks)

QUESTION TWO

- (a) Write the output, if any, to each of the Java code extracts below:

```

(i) public class test {
      public static void main (string [ ] args) {
        int [ ] x = new int [5];
        int i ;
        for (i = 0; i < x.length; i++)
          x [i] = i;
        system.out.println (x [i]);
      }
    }
  
```

(2 marks)

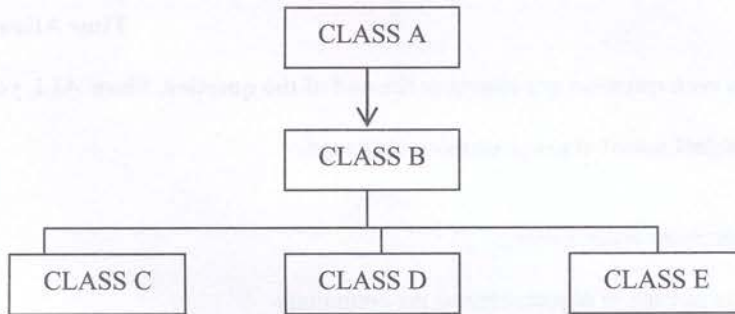
(ii)

```
public class test {
    public static void main (string [ ] args) {
        int list [ ] = {1, 2, 3, 4, 5, 6};
        for (int i = 1; i < list.length; i++)
            list [i] = list [i - 1];
        for (int i = 0; i < list.length; i++)
```

 (2 marks)

(b) Write a program that takes a 2-D array, adds elements of each row and returns a 1-Dimension array whose elements are the sum of each row. (6 marks)

(c) Using the concept of inheritance, explain the class hierarchy below:



(4 marks)

(d) Java program collection framework provides a well-designed set of interfaces and classes that support operations on a collection of objects.

Required:

Explain three basic interfaces that reside in the Java collections framework.

(6 marks)

(Total: 20 marks)

QUESTION THREE

(a) (i) Explain two rules for runtime polymorphism. (2 marks)

(ii) Highlight two limitations of runtime polymorphism. (2 marks)

(b) (i) You have been tasked to design a web-based solution using templates in Java programming language. The specific task requires you to implement the characteristic properties of a vehicle such as its speed calculation formula and torque calculation.

Required:

Summarise four advantages of using templates in Java programming.

(4 marks)

(ii) Break down the likely use cases for templates in Java for the scenario in (b) (i) above. (4 marks)

(c) (i) Write code in Java that demonstrates how serialisation works by creating an employee class. The class includes "name" and "address" features and a method mailcheck() that should print out the output: "Mailing a letter to (name); (address)". (4 marks)

(ii) Citing the areas of communication, persistence, deep copy and cross Java Virtual Machine (JVM) synchronisation, defend the need for serialisation in Java programming language. (4 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Describe three types of Java programming language access modifiers. (6 marks)

(b) Consider the code below:

```

class Demo {
    public void finalise ( ) {
        system.out.println ("object");
    }
}
  
```

```

public static void main (string [ ] args) {
Demo obj1 = newDemo ( )
Demo obj2 = newDemo ( )
Obj1 = null;
Obj2 = null;
System.gc ( );
}
}

```

Required:

Interpret the following in the context of Java garbage collection as used in the above program:

- (i) Obj1 and Obj2. (2 marks)
 - (ii) The statement containing "system.gc". (2 marks)
 - (iii) Citing two pros and four cons, critique the concept of Java garbage collector. (6 marks)
- (c) The market currently has several Java deployment management tools which could help in software development management. (4 marks)
- Propose two top Java deployment management tools. (4 marks)

(Total: 20 marks)

QUESTION FIVE

(a) Describe each of the following types of Java programs:

- (i) Java stand-alone applications. (2 marks)
- (ii) Java applets. (2 marks)

(b) Study the program segment given below:

```

for (int m = 5; m <= 20; m += 5)
{
    if (m% 3 == 0)
        break;
    else
        if (m% 5 == 0)
            system.out.println (m);
            continue;
}

```

Required:

- (i) Write the output of the program segment. (2 marks)
 - (ii) Justifying your answer, determine the number of times the body of the loop gets executed. (3 marks)
- (c) Using a class named "pattern", write a Java program to display the pattern below:

```

C
C I
C I C
C I C T

```

(4 marks)

(d) Using a function, write a Java program to find the factorial of a number.

Ensure that the number is passed as an argument by performing the following tasks:

- (i) Creating a function for input. (2 marks)
 - (ii) Creating another function to display the number and its factorial. (2 marks)
- (e) Describe "stack unwinding" as used in Java program exception handling. (3 marks)

(Total: 20 marks)