

CICT PART II SECTION 4

OBJECT ORIENTED PROGRAMMING

THURSDAY: 2 September 2021.

Time Allowed: 3 hours.

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

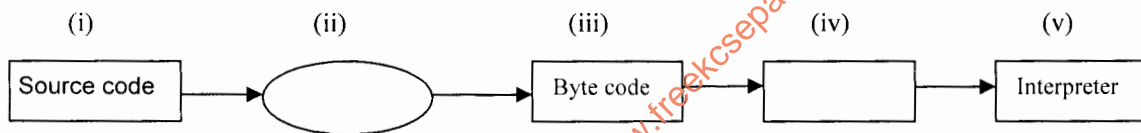
ALL programs written should be in Java object oriented programming language.

QUESTION ONE

(a) Explain each of the following terms as used in object oriented programming:

- (i) Literal. (2 marks)
- (ii) Precedence of operators. (2 marks)

(b) The diagram below represents the Java program execution sequence:



- (i) Name the items labelled (ii) and (iv). (2 marks)
  - (ii) Name the extensions used by files labelled (i) and (iii). (2 marks)
  - (iii) Explain the importance of the file labelled (v). (2 marks)
- (c) Write a Java program containing two classes; Computer and Laptop both having their own constructors and methods. Create objects for the two classes in the main method to be used for calling the methods. (7 marks)
- (d) Study the following simple constructor segment

```
Class Myclass {
    int x;
    // This is the constructor
    Myclass (int i) {
        x = 1;
    }
}

Public class Cons Demo {
    Public static void Main (String args [ ])
    {My class t1 = new Myclass (10);
    My class t2 = new Myclass (20);
    System.out.println (t1.x + " " + t2.x)
    }
}
```

**Required:**  
Indicate the output after the execution of the code.

(3 marks)  
(Total: 20 marks)

## QUESTION TWO

- (a) Define the term “type mismatch error” as used in Java programming. (2 marks)
- (b) Distinguish between a “thread stack” and a “heap” as used Java programming. (4 marks)
- (c) Appraise four advantages of encapsulation in Java programming. (4 marks)
- (d) Write a program in Java to calculate squares of numbers 1 to 5 using a method getsquare ( ). (4 marks)
- (e) Study the pseudocode below of determining whether or not a given year is a leap year:
1. If the year is evenly divisible by 4, go to step 2. Otherwise, go to step 5.
  2. If the year is evenly divisible by 100, go to step 3, Otherwise, go to step 4.
  3. If the year is evenly divisible by 400, go to step 4. Otherwise, go to step 5.
  4. The year is a leap year (it has 366 days).
  5. The year is not a leap year (it has 365 days).

### Required:

Convert the pseudocode into a Java program.

(6 marks)

**(Total: 20 marks)**

## QUESTION THREE

- (a) Overriding is a core concept in object oriented programming.
- Summarise six rules for overriding inherited methods. (6 marks)
- (b) Highlight two advantages of serialisation in object oriented programming. (4 marks)
- (c) Write a Java program that prints out the free memory in Java Virtual Machine (JVM) and performs garbage collection using gc method of RunTime Class. Use the freeMemory ( ) method to return amount of memory in JVM and use getRunTime ( ) method to get reference of the current runtime object. (6 marks)
- (d) Write a program in Java named “myobj” that will access attributes of a class by creating an object of the main class. Initialise the x attribute value to 40 on the object to print its value. (4 marks)

**(Total: 20 marks)**

## QUESTION FOUR

- (a) (i) Describe the term “custom exception” as used in Java programming. (2 marks)
- (ii) Examine four types of generics that can be applied in Java. (4 marks)
- (b) (i) Explain the terminology “object-relational data” model. (2 marks)
- (ii) Highlight one disadvantage of object relational data model. (2 marks)
- (c) Create two packages named pack and mypack. Make a class of pack package public so that it can be accessed from outside the package. Use the appropriate access modifier so that it can be accessed from outside the class only through inheritance. (6 marks)
- (d) Write a program in Java to find the largest of three numbers: num1, num2 and num3 input by the user using if...else... statement. (4 marks)

**(Total: 20 marks)**

## QUESTION FIVE

- (a) Distinguish between “iterator pattern” and “singleton pattern” as used in object oriented programming. (4 marks)
- (b) Java is a program guaranteed to be write once, run anywhere.
- Highlight six features to support the above statement. (6 marks)

- (c) Create a program in Java with a base class trainer and a subclass engineering trainer. Let the program output the following:
- CollegeName - NewHorizons
  - designation
  - mainSubject
- (5 marks)

- (d) Casual employees at Bidii Company begin their session at 8: 12: 15 A.M. and end at 12: 34: 55 P.M. daily. The management would like to know how long the session takes for purposes of payment.

**Required:**

Write a program in Java to calculate the difference between the two time periods using a method named diff.

(5 marks)

**(Total: 20 marks)**

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