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UNIVERSITY OF GHANA

B.SC, FIRST SEMESTER UNIVERSITY EXAMINATIONS: 2017/2018

DEPARTMENT OF COMPUTER SCIENCE

CSIT 205: OBJECT-ORIENTED TECHNIQUES FOR I.T. PROBLEM SOLVING (3 CREDITS)

INSTRUCTIONS:

Section A: Answer ALL questions in this section.

Section B: Answer Question 1 and ANY TWO (2) questions from section B.

TIME ALLOWED:
THREE (3) HOURS

SECTION A (30 MARKS)

1. Which of the following statements correctly describes an interface?
a). It's a concrete class.
b). It's a superclass.
c). It's a type of abstract class.
d). It's a subclass.

2. You would use the ____ operator to create a single instance of a named class.
a). new.
b). dot.
c). equals.
d). <>.

3. An interface contains _____ methods.
a). non-abstract.
b). implemented.
c). unimplemented.
d). abstract.

4. What will be the result of compiling the following code?
public class Test{

```
        static int age = 8;
        public static void main (String args []){
                age = --age +1;
                System.out.println("The age is " + age);
        }
}
```

a). Compiles and runs with no output.
b). Compiles and runs printing out "The age is 8".
c). Compiles and runs printing out "The age is 7".
d). Compiles and runs printing out "The age is 9".

5. What is the value of y when the code below is executed?

```
int x = 4;
int y = (int)Math.ceil(x % 5 + x / 5.0);
```

a). 1
b). 6
c). 5
d). 4

6. What is the output of the following program?

```
public class Test
{
        public static void main( String[] args )
        {
                private static final int value = 5;
                float total;
                total = value + value / 2;
                System.out.println( total );
        }
}
```

a). 7.5
b). 7.0
c). 5.0
d). None of the above

7. Consider the following program:

```
import myLibrary.*;
public class ShowSomeClass
{
// code for the class...
}
```

What is the name of the java file containing this program?
a). myLibrary.java

b). ShowSomeClass.java
c). ShowSomeClass
d). ShowSomeClass.class

8. What is the value of variable z after executing the following code?

```
int x = 5; int y = 5;
int z = 5;
if (x > 3) if (y > 4) if (z > 5) z += 1;
 else z += 2;
else z += 3; z += 4;
```

a). 9
b). 5
c). 11
d). 7

9. _____ is one of the java features that enables java program to run anywhere anytime.
a). Object-Oriented
b). Multithreaded
c). Platform-Independent
d). Dynamic & Extensible

10. _____ operators are used to construct mathematical expression as in algebra).
a). Relational
b). Mathematical
c). Arithmetic
d). Logical

11. Which of the following is not assignment operator?
a). +=
b). = =
c). %=
d). =

12. String class in encapsulated under which package?
a). javac.lang
b). javac.util
c). javac.io
d). javac.awt

13. Which of these keywords is used to prevent content of a variable from being modified?
a) final
b) last
c) constant
d) static

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14. Command to execute a compiled Java program is _____
a). javac
b). java
c). run
d). execute

15. The Java compiler
a). creates executable
b). translates Java source code to byte code
c). creates classes
d). produces Java Interpreter

16. What is the process of defining more than one method in a class differentiated by method signature?
a) Function overriding
b) Function overloading
c) Function doubling
d) None of the mentioned

17. Which of the following is a method having same name as that of its class?
a) finalize
b) delete
c) class
d) constructor

18. Which method can be defined only once in a program?
a) main method
b) finalize method
c) static method
d) private method

19. Which of these selection statements test only for equality?
a) if
b) switch
c) if & switch
d) None of the mentioned

20. Which of these are selection statements in Java?
a) if()
b) for()
c) continue
d) break

21. Which of the following loops will execute the body of loop even when condition controlling the loop is initially false?
a) do-while

b) while
c) for
d) None of the mentioned

22. Which of these jump statements can skip processing remainder of code in its body for a particular iteration?
a) break
b) return
c) exit
d) continue

23. Which of these statement is correct?
a) switch statement is more efficient than a set of nested ifs.
b) two case constants in the same switch can have identical values.
c) switch statement can only test for equality, whereas if statement can evaluate any type of boolean expression.
d) it is possible to create a nested switch statements.

24. Translate this statement into Java: If the value of temperature is in between 20.0 and 40.0, print "very cold".
a). if(!(temperature < 20.0 || temperature > 40.0)) System.out.println("very cold");
b). if(20.0 <= temperature <= 40.0) System.out.println("very cold");
c). if(temperature >= 20.0 || temperature <= 40.0) System.out.println("very cold");
d). if(temperature >= 20.0 | temperature <= 40.0) System.out.println("very cold");

25. Which of the following is a valid declaration of an object of class Box?
a) Box obj = new Box();
b) Box obj = new Box;
c) obj = new Box();
d) new Box obj;

26. What will be output using following code block?
int[] a = {0,1,2,3,4,5,6,7,9,10,11,12};
System.out.println(a.length);
a). 10
b). 11
c). 12
d). 13

27. What is the output of this program?

```
class Evaluate {
        public static void main(String args[])
        {
                int arr[] = new int[] {0 , 1, 2, 3, 4, 5, 6, 7, 8, 9};
                int n = 6;
                n = arr[arr[n] / 2];
```

```
            System.out.println(arr[n] / 2);
        }
}
```

a). 3
b). 0
c). 6
d). 1

28. A constructor
a). must have the same name as the class it is declared within.
b). is used to create objects.
c). may be declared private
d). A and B

29. Which of the following is NOT a key component of object oriented programming?
a). Inheritance
b). Encapsulation
c). Polymorphism
d). Parallelism

30. _____ Keyword is used to invoke the current object.
a). new
b). static
c). this
d). object

SECTION B

Answer Question one (1) and any other two (2) questions.

Q1. Explain briefly the following terms as related to object-oriented design in Java

i. Inheritance
ii. Polymorphism
iii. Superclass
iv. Subclass
v. Abstract Class
vi. Constructors
vii. Interface
viii. Method Overloading
ix. Method Overriding
x. Instantiation
xi. Exceptions
xii. Static Variable
xiii. Access Modifiers
xiv. Casting
xv. Immutable Object

[30 Marks]

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Q2.

a. Write a method that displays all the numbers from **10** to **1000** that are divisible by **5** and **6.** [5 Marks]

b. Assume an array with name **myArray** exists.
Write **statements** to do the following:

i. Copy elements of **myArray** variable into **myNewArray** variable where both **myNewArray** and **myArray** have the same data type and size.

ii. Write a method that computes the sum of all elements in the **myArray**.

iii. Write a method that finds the minimum element in the **myArray**.

iv. Write a method that prints the elements stored in the odd indexes of the **myArray**.

v. Write a method that orders the elements in **myArray** in ascending order.

[15 Marks]

Q3.

a. Write a Java method that accepts an integer and returns all the prime numbers up to that number in an array. [8 Marks]

b. Write a program that **reads** the balance and the annual percentage interest rate and displays the interest for the next month using the following formula:

interest = balance * (annualInterestRate / 1200)

[12 Marks]

Q4. Write a class named **QuadraticEquation** for a quadratic equation. The class should contain:

i. Private data fields **a**, **b**, and **c** that represents three coefficients.

ii. A constructor for the arguments for **a**, **b**, and **c**.

iii. Three **get** methods for **a**, **b**, and **c**.

iv. A method named **getDiscriminant()** that returns the discriminant, which is $\mathbf{b^2 - 4ac}$.

v. The methods named **getRoot1()** and **getRoot2()** for returning two roots of the equation

$$r_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \text{ and } r_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

[20 marks]