

MOCK TEST PAPER (SOLVED)

Subject : COMPUTER APPLICATIONS (THEORY)

Class : X (ICSE)

(Two Hours)

Answers to this paper must be written on the paper provided separately.

You will not be allowed to write during the first 15 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this paper is the time allowed for writing the answers.

This paper is divided into two sections.

You are to answer **all** questions from **Section A** and **any four** questions from **Section B**.

The intended marks for questions or parts of questions are given in brackets [].

SECTION - A

(40 MARKS)

Attempt **all** questions from this part

Question 1

- (a) What is the benefit of using methods in Java programs ?
- (b) What do you understand by parameters ?
- (c) Write two characteristics of strings.
- (d) What are the different primitive data types ?
- (e) if $m = 10$ and $n = 12$ output the values of m and n after execution in (i) and (ii) :-
 - (i) $m = m*n - n$;
 - (ii) $n = m + m/n + n$;

10 marks

Answer

- (a) Benefit of using methods in Java Programs-
 - (i) To cope complexity
 - (ii) To hide the details
 - (iii) For reusable code
 - (iv) To simplify program maintenance
- (b) The value of the argument is referenced by the parameter name during execution of that method. The parameter list appears between the parenthesis following the methods name. It specifies the data type of each value that can be passed as an argument to a method and the name that is to be used in the body of the method to refer to the value passed.
- (c) (i) A string is a series of characters. In Java, String is a class.
(ii) String is delimited by double quotation marks.
- (d) There are 8 different types of primitive data types namely- byte, short, long, int, float, double, char, boolean.
- (e) (i) $m = m*n - n$;
 $= 10*12 - 12 = 108$
(ii) $n = m + m/n + n$;
 $= 10 + 10/12 + 12 = 10 + 0 + 12 = 22$

Question 2

- (a) State the two kinds of data types.
- (b) Write the corresponding expressions for the following mathematical operations -
 - (i) $x = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
 - (ii) $a = x^3 + y^3 + z^3 - 3xy - 3yz$
- (c) What is the difference between pure and impure function ?
- (d) What is if-else ladder ?
- (e) What is the difference between primitive data types and composite data types ?

10 marks

Answer

- (a) Two kinds of data types are – Primitive data type and Derived data type.
Primitive data types contain integers, floating point numbers, characters and boolean.
Derived data types are classes, arrays and interfaces.
- (b) (i) $\text{double } x = \text{Math.pow}(a,2) + \text{Math.pow}(b,2) + \text{Math.pow}(c,2) + 2*(a*b + b*c + c*a)$
(ii) $\text{double } a = \text{Math.pow}(x,3) + \text{Math.pow}(y,3) + \text{Math.pow}(z,3) - 3*x*y - 3*x*z - 3*y*z$

(i)

(c) Difference between Pure and Impure Function.

Pure functions are those functions which do not change the state of object. In other terms we can say that it returns a value without bringing any change in the values being passed to it. For example-

```
value(int x, int y)
```

```
{
if (x == y)
return (x + y);
else
return (x - y);
}
```

In the above example, the method returns the value are not being changed. It returns value according to the condition.

Impure functions are those functions which change the state of objects. In other terms we can say that it brings change in the argument that it receives. Impure function may or may not return a value.

The change brought by the impure function is also called side effect of impure function.

For example-

```
value(Count number)
```

```
{
number.increment = number.increment+1;
}
```

In the above program segment, the argument number takes the object of class Count. The increment variable of class Count is incremented by 1 every time the function value is called.

(d) This is a way of putting ifs together when multi-path decisions are involved. A multi-path decision involves a chain of ifs in which the statement associated with each else is an if. It takes the following form-

```
if (condition1)
```

```
    statement 1;
```

```
else if (condition 2)
```

```
    statement 2;
```

```
else if (condition 3)
```

```
    statement 3;
```

```
else if (condition n)
```

```
    statement n;
```

```
else
```

```
    default statement;
```

(e) Primitive data types are in-built data types. Java allows to use data of any of these type.

The data types which are based on primitive data types are known as composite data types. These data types are defined by the user, therefore, they are also called user-defined data types.

Question 3

(a) What is meant by default visibility of a method ?

(b) Find and correct the errors in the following program segment -

```
int a ( ) = (1, 3, 4, 8, 9);
```

```
for (int i = 0; i = 5; i ++)
```

```
System.out.println (“a [“ + i + ”] = ” + a [i] );
```

(c) Explain constructor overloading with an example.

(d) Find the output of the following program segment, when

(i) $x = 100$

(ii) $x = 200$

```
int x, sum, n = 550;
```

```
sum = n + x > 400 ? 100 : 200 ;
```

```
System.out.println(sum);
```

(e) What is default constructor ? Write a program to swap the values of two variables without using third variable and print the swapped values.

(f) What is a wrapper ? Give an example.

(g) Explain the different ways you can use a return statement.

15 marks

Answer

(a) Default Visibility :

When you do not specify the public or private access for a variable or a method, in such a case, it will have default visibility. Default visibility allows a variable or a method to be seen within all methods of that class or the other classes that are the part of the same package.

In general terms, default visibility is the same thing as public visibility, but it is always better to explicitly declare members as public. You cannot explicitly declare a member of a class to have a default visibility.

(b) `int a() = (1,3,4,8,9);` should be written as `int a[] = {1,3,4,8,9};`;

`for(int i=0; i=5; i++)` should be written as `for(int i=0; i<5; i++)`

(c) Constructor Overloading

Constructors can also be overloaded like methods. With different initial values of data, we can generate objects of a class by overloading constructors.

Illustration

```
class Overloading
```

```
{
```

```
int x;
```

```
float y; //variables declaration
```

```
Overloading( ) //constructor no.1
```

```
{
```

```
x = 0;
```

```
y = 0;
```

```
}
```

```
Overloading(int a) //constructor no.2
```

```
{
```

```
x = a;
```

```
y = 0;
```

```
}
```

```
Overloading(int a, float b) // constructor no.3
```

```
{
```

```
x = a;
```

```
y = b;
```

```
}
```

```
public static void main(String args[ ])
```

```
{
```

```
Overload obj1 = new Overload(); //constructor no.1
```

```
Overload obj2 = new Overload(15); //constructor no.2
```

```
Overload obj3 = new Overload(10,5.5); //constructor no.3
```

```
}
```

```
}
```

(d) (i) 100

(ii) 100

(e) A default constructor is a special member function which initialises the data members of a class. It is called default constructor because it declares no parameters.

```
class swapping
```

```
{
```

```
public static void main(String arg[ ])
```

```
{
```

```
int a, b;
```

```
System.out.println("Enter First Number" +a);
```

```
System.out.println("Enter Second Number" +b);
```

```
if (a > b)
```

```
{
```

```
a = a - b;
```

```
b = a + b;
```

(iii)

```

a = b - a;
}
if (b > a)
{
b = b - a;
a = a + b;
b = a - b;
}
System.out.println("After swapping a =" +a);
System.out.println("After swapping b =" +b);
}
}

```

(f) Java provides enumerated classes which deal only with objects to store a simple type data in one of these classes. Need arises to wrap the simple type in to a class. These classes wrap the simple types within a class. These are known as class wrappers.

(g) Return Statement

The return statement is used with the methods to return a value. It is to be noted that a function can return only one value. The return is a keyword in Java.

A return statement can be used in various forms to —

(i) return constant value

(ii) return variable

(iii) return expression

(iv) return boolean value

Valid examples of return statements are-

return 0;

return a;

return x*x*x;

return 1;

return true;

return false;

SECTION - B

(60 MARKS)

*Attempt any **four** questions from this Section.*

*The answers in this Section should consist of the **Programs in either in Blue J environment or any program environment with Java as the base.** Each program should be written using **Variable descriptions/Mnemonic Codes** such that the logic of the program is clearly depicted. Flow-charts and algorithms are **not required**.*

Question 4

Write a program to

(a) Store the Roll No., Name and Marks of six subjects for 50 students.

(b) Calculate the percentage of marks obtained by each students.

(c) Calculate the grade as per the given criteria :

Percentage	Marks	Grade
Less than 40		Fail
From 40 to 59		C
From 60 to 79		B
From 80 to 100		A

15 marks

Answer

```

import java.io.*;
import java.lang.*;
"
class grade
{

public static void main(String args[ ]) throws IOException
{
int rno[ ] = new int[50];
String name[ ] = new String[50];

```

(iv)

```

double mark[ ][ ] = new double [50][6];
double total[ ] = new double [50];
double per[ ] = new double [50];
String gr[ ] = new String [50];
int i, j;

Input Stream Reader reader=new Input Stream Reader (System.in);
Buffered Reader input=new Buffered Reader (reader);

// To store data about students and to calculate total and percentage

for (i = 0; i < 50; i++)
{
System.out.println(" ");
System.out.println("Enter data for student "+ (i + 1));
System.out.print("Enter rollnumber : ");
String n = input.readLine( );
rno [i] = Integer.parseInt(n);

System.out.print ("Enter name : ");
name [i] = input.read Line ( );
double s = 0.0;

for (j = 0; j < 6; j + +)
{
System.out.print("Enter marks in subject" + (j + 1) +" : ");
String n1= input.readLine( );
mark [i] [j] = Double.parseDouble (n1);
s = s + mark [i] [j];
}
total [i] = s;
per [i] = total [i]/6;

// To calculate grade for each student

if (per[i] >= 80) gr[i] = "A";
else if (per[i] >= 60) gr[i] = "B";
else if (per[i] >= 40) gr[i] = "C";
else gr[i] = "Fail";
}

// To print Result

System.out.println(" ");
System.out.println(" ");
System.out.println("Rollno      Name      Sub1      Sub2      Sub3      Total      Percentage      Grade");
System.out.println(" ");
System.out.println("===== ");

for (i = 0; i < 50; i++)
{
System.out.print(+rno[i] + "      " + name[i] );

```

```

for(j=0;j<6;j++)
{
System.out.print("          " +mark[i][j]);
}
System.out.print("          "+total[i]+"          "+per[i]+"          "+gr[i]);
System.out.println(" ");
}

System.out.println("Developed by : ");
System.out.println("Prof S.Chopra (9814814747)");
System.out.println("101,rose park,jalandhar");
System.out.println("*****For Evergreen Publications*****");

}
}

```

Question 5

Consider the following string –

“HONESTY IS THE BEST POLICY. BE HONEST AND ENJOY”.

Write a program that displays the number of times a letter ‘O’ exists in it.

15 marks

Answer

```

public class Vowel
{
public static void main(String arg [ ])
{
String s = "HONESTY IS THE BEST POLICY. BE HONEST AND ENJOY";
int len = s.length( );
int count = 0;
for(int i = 0; i < len; i++)
{
char a = s.charAt(i);
if (a == 'O')
count ++;
}
System.out.println ("The Number of times O's in the String=" +count);
}
}

```

Question 6

EVERGREEN FINANCE COMPANY has the following interest rates for investments.

(Note that interest is compounded half yearly).

Investment (Rs)	Rate of Interest
Upto 10000	5%
From 10001 to 20000	6%
From 20001 to 30000	7%
From 30001 to 40000	8%
From 40001 to 50000	8.5 %
From 50001 and above	10%

Design a program in Java to calculate the final amount the customer has to pay after completion of 4 years. Print the result in the following format :-

EVERGREEN FINANCE COMPANY

NAME OF THE CUSTOMER : RS.
PRINCIPAL AMOUNT : RS.
INTEREST AMOUNT : RS.
TOTAL AMOUNT : RS.

15 marks

Answer

Note : Save the file with filename **Interest.java**

```
import java.io.*;

class Interest
{
    public static void main(String args[ ]) throws IOException
    {
        int time = 4*2;
        double amount,rate;

        InputStreamReader reader=new InputStreamReader(System.in);
        BufferedReader input=new BufferedReader(reader);

        System.out.print("Enter name : ");
        String name=input.readLine( );

        System.out.print("Enter amount : ");
        String n=input.readLine( );
        amount=Double.parseDouble(n);

        if (amount > 50000) rate = 10.0/2;
        else if (amount > 40000) rate = 8.5/2;
        else if (amount > 30000) rate = 8.0/2;
        else if (amount > 20000) rate = 7.0/2;
        else if (amount > 10000) rate = 6.0/2;
        else rate = 5.0/2;

        double total = amount*Math.pow((1+rate/100),time);
        double cintr = total - amount;

        System.out.println(" ");
        System.out.println(" ");
        System.out.println(" EVERGREEN FINANCE COMPANY ");
        System.out.println(" ");
        System.out.println(" NAME OF THE CUSTOMER : "+name);
        System.out.println(" PRINCIPAL AMOUNT : RS. "+amount);
        System.out.println(" INTEREST AMOUNT : RS. "+cintr);
        System.out.println(" TOTAL AMOUNT : RS. "+total);
        System.out.println(" Developed by : ");
        System.out.println(" Prof S.Chopra (9814814747)");
        System.out.println(" 101,rose park,jalandhar");
        System.out.println("*****For Evergreen Publications*****");
    }
}
```

Question 7

Write a program using a function called area () to compute the area of a :-

(i) cylinder (2 p rh) where p = 3.14

(ii) cuboid (2(length*breadth + breadth*height + height*length))

Display the menu to output the area as per user's choice.

(Use Function Overloading technique).

15 marks

Answer

Note : Save the file with filename **Calculatearea.java**

```

import java.io.*;
import java.lang.*;

// function overloading

class Calculatearea
{
    public double area(double r1,double h1)
    {
        double pi=3.14;
        return(2*pi*r1*h1);
    }

    public double area(double l,double b,double h)
    {
        return(2*(l*b+b*h+h*l));
    }

    public void printa()
    {
        System.out.println(" ");
        System.out.println("Developed by : ");
        System.out.println("Prof S.Chopra (9814814747)");
        System.out.println("101,rose park,jalandhar");
        System.out.println("*****For Evergreen Publications*****");
    }

    public static void main(String args[ ]) throws IOException
    {
        double r,h,length,breadth,hieght;
        int choice;
        InputStreamReader reader=new InputStreamReader(System.in);
        BufferedReader input=new BufferedReader(reader);

        while(true)
        {
            System.out.println("Press 1. Area of cylinder : 2*pi*r*h ");
            System.out.println("Press 2. Area of cuboid : 2*(length*breadth+breadth*height+height*length)");
            System.out.println("Press 3. Exit");

            System.out.print("Enter choice :: ");
            String o=input.readLine( );
            choice=Integer.parseInt(o);
            Calculatearea R = new Calculatearea( );

            switch(choice)
            {
                Case 1 :
                System.out.print("Enter value of r : ");
                String n1=input.readLine( );
                r=Double.parseDouble(n1);
                System.out.print("Enter value of h : ");
                String n2=input.readLine( );

```



```

h=Double.parseDouble(n2);
System.out.println("Area of cylinder (Function overloading) = " +R.area(r,h));
R.printa( );
break;

```

Case 2 :

```

System.out.print("Enter value of length : ");
String n3=input.readLine( );
length=Integer.parseInt(n3);
System.out.print("Enter value of breadth : ");
String n4=input.readLine( );
breadth=Double.parseDouble(n4);
System.out.print("Enter value of hieght : ");
String n5=input.readLine( );
hieght=Double.parseDouble(n5);
System.out.println("Area of cuboid (Function overloading) = " +R.area(length,breadth,hieght));
R.printa( );
break;

```

```

case 3:
R.printa( );
return;
}
}
}
}

```

Question 8

Write a program to selection sort the following set of values in ascending order :-
15, 13, 18, 14, 19, 12, 11, 108, 26

Output :

```

11
12
13
14
15
18
19
26
108

```

15 marks

Answer

Note : Save the file with filename **Selectionsort.java**

```

import java.io.*;
class Selectionsort
{
public static void main(String args[ ]) throws IOException
{
int a[]={15,13,18,14,19,12,11,108,26};
int n=8,loc,i,j,min,temp;
System.out.println("Given unsorted set of values : ");
for(i=0;i<n;i++)
{
System.out.println(+a[i]);
}
}
}

```

```

//selection sort
for(i=0;i<n-1;i++)
{
    min=a[i];
    loc=i;
    for(j=i+1;j<n;j++)
    {
        if(a[j]<min)
        {
            min=a[j];
            loc=j;
        }
    }
    temp=a[i];
    a[i]=a[loc];
    a[loc]=temp;
}
System.out.println("Sorted set of values using selection sort : ");
for(i=0;i<n;i++)
{
    System.out.println(+a[i]);
}
System.out.println("Developed by : ");
System.out.println("Prof S.Chopra (9814814747)");
System.out.println("101,rose park,jalandhar");
System.out.println("*****For Evergreen Publications*****");
}
}

```

Question 9

Write a program in Java to compute and display the sum of following series -

(a) $1 + 8 + 27 + 64 + 125 + \dots n$ terms

(b) $\frac{X}{5} + \frac{X}{8} + \frac{X}{11} + \frac{X}{14} + \frac{X}{17} + \dots + \frac{X}{N}$

15 marks

Answer

Note : Save the file with filename **Seriessum.java**

```

import java.io.*;
import java.lang.*;
class Seriessum
{
    public double sumOfcubes(int n)
    {
        double s=0;
        int count=1;
        for(int i=1;count<=n;i++)
        {
            s=s+Math.pow(i,3);
            count++;
        }
        return(s);
    }
    public void printa( )
    {
        System.out.println("");
        System.out.println("Developed by : ");
    }
}

```

```

System.out.println("Prof S.Chopra (9814814747)");
System.out.println("101,rose park,jalandhar");
System.out.println("*****For Evergreen Publications*****");
}

public double sumOfFractions(int n,double x)
{
    double s=0.0;
    for(int i=5;i<=n;i+=3)
    {
        s=s+x/i;
    }
    return(s);
}

public static void main(String args[ ]) throws IOException
{
    int n;
    double X;
    int choice;
    InputStreamReader reader=new InputStreamReader(System.in);
    BufferedReader input=new BufferedReader(reader);
    while(true)
    {
        System.out.println("Press 1. To find 1 + 8 + 27 + .....+ n terms :: ");
        System.out.println("Press 2. To find X/5 + X/8 + X/11 + .....+ X/N :: ");
        System.out.println("Press 3. To Exit                :: ");

        System.out.print("Enter choice :: ");
        String o=input.readLine( );
        choice=Integer.parseInt(o);
        Seriessum R = new Seriessum( );
        switch(choice)
        {
            Case 1 :
            System.out.println("Enter value of n : ");
            String n1=input.readLine( );
            n=Integer.parseInt(n1);
            System.out.println("Sum of series = " +R.sumOfcubes(n));
            R.printa( );
            break;

            Case 2 :
            System.out.print("Enter value of N : ");
            String n3=input.readLine( );
            n=Integer.parseInt(n3);
            System.out.print("Enter value of X : ");
            String n2=input.readLine( );
            X=Double.parseDouble(n2);
            System.out.println("Sum of series = " +R.sumOfFractions(n,X));
            R.printa( );
            break;

            Case 3:
            R.printa( );
            return;
        }
    }
}

```