DEPARTMENT OF I&CT, MIT, Manipal

OBJECT ORIENTED PROGRAMMING ICT 2122 SCHEME
MID TERM EXAMINATIONS-26-09-2023

Total Marks: 30 Marks

Q1. What is the output of the following code snippet?

```
public class Solution{
public static void main(String[] args){
        short x = 20;
        x =  x * 2;
        System.out.print(x);
}
 } (0.5)
```

1. **Compilation Error
2. Exception
3. 20
4. 40

Q2. What is the output of the following code snippet?

```
public class Solution{
    public static void main(String[] args){
        byte x = 127;
        x++;
        x++;
        System.out.print(x);
    }
}  (0.5)
```

1. ** -127
2. 127
3. 129
4. 2

Q3. What is the output of the following code snippet?

```
public class Solution{
  public static void main(String[] args){
      int[]  x = {120, 200, 016};
      for(int i = 0; i < x.length; i++){
          System.out.print(x[i] + " ");
      }     }     } (0.5)
```

1. 120 200 016
2. **120 200 14
3. 120 200 016
4. Compilation error

Q4. Find the value of a[1] after execution of the following program.

```
int[] a = {0,2,4,1,3};
for(int i = 0; i < a.length; i++){
   a[i] = a[(a[i] + 3) % a.length];
}
```
(0.5)

1. 0
2. **1
3. 2
4. 3

Q5 Identify the correct restriction on static methods :

A. They must access only static data
B. They can only call other static methods.
C. They cannot refer to this or super.
D. They can refer to this or super.
E. They can call all other methods present in the class to which it belongs to. (0.5)

1. A,B,D,E
2. A,B,D
3. A, B
4. ** A,B,C

Q6. How many object(s) are created when the following code is run?

```
Public class Test{
        Public static void main(String argos[]){
          String a = new String("GOOD LUCK");
                String b = new String("GOOD LUCK");
                String c = "GOOD LUCK";
                String d = "GOOD LUCK";
        }    } 
```
(0.5)

1. 1

2. 2
3. **3
4. 4

Q7. What is the output of the following code snippet?

```
double num[] = {5.5, 10.1, 11, 12.8, 56.9, 2.5};
 float result=0;
 for (int i = 0; i < 5; ++i)
 result = result + num[i];
 System.out.print(result/6);
```

(0.5)

1. **Error
2. 16
3. 16.05

Q8. What is the output of the following code snippet ?

```
class test{
        static int x;
        static void display() { System.out.println(x); }
        public static void main(String args[]){
                test t1=new test();
                t1.display();
        } }
```

(0.5)

1. Error: non static method cannot be called by a static method
2. **0
3. Error: x not initialized
4. Garbage value

Q9. Consider the following interface definition:

```
interface Base
{
        boolean m1 ();
        byte m2(short s);
}
```

which one of the given code fragment will compile without error(s)? (0.5)

1. **abstract class Class2 implements Base
   { public boolean m1(){ return (7 > 4); }}
2. interface Base2 implements Base {}

3. abstract class Class2 extends Base
   { public boolean m1(){ return true; }}

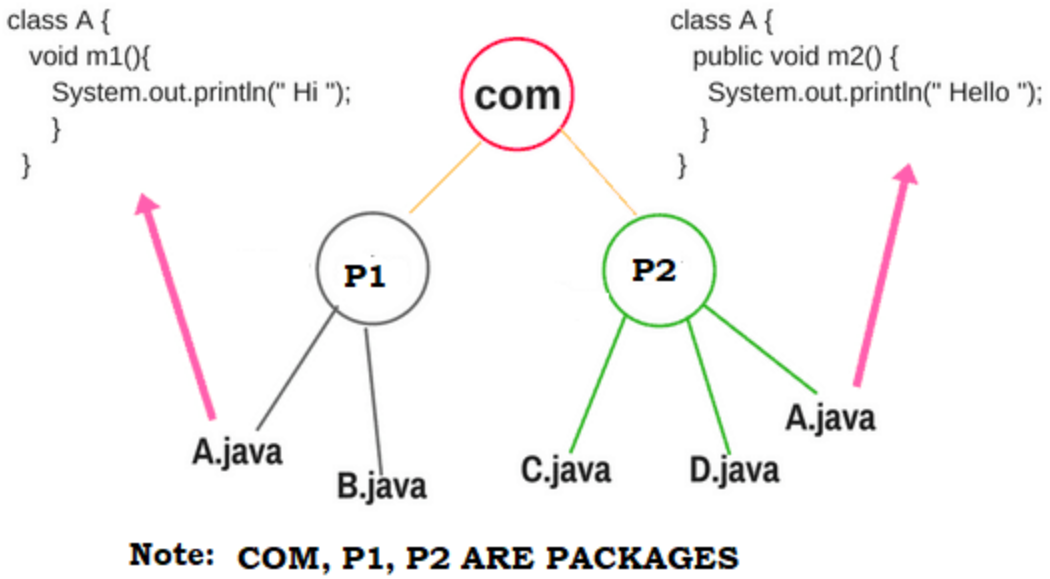
4. abstract class Class2 implements Base
   { protected boolean m1(){ return (5 > 7) }}

Q10. What is the output of the following code snippet?

```
public class Main {
  public static void main(String arg[]) {
    int i;
for (i = 1; i <= 12; i += 2) {
      if (i == 8) {
        System.out.println(i);
        break;
      }   }   }   } (0.5)
```

1. 1
2. **No output
3. 8
4. 1357911

Q11 . Consider the below figure (Figure.Q13)



In the com package, there are two sub-packages "P1" and "P2". The sub-package "P1" contains two class files A.java and B.java. Whereas the sub-package P2 contains three class files C.java, D.java, and A.java.

How will you call m1() of class A of sub-package P1 and m2() of class A of sub-package P2 from class B of sub-package P1?Write the code to illustrate the same. . (3)

SCHEME:

complete path should be specified com.P2.A - 1mark ,

invoke m1() and m2()- 1 mark,

complete code 1 mark.

Correct Sample Code:

```
package com.P1;
class B
{
  void m3()
  {
     System.out.println("Hello Java");
  }
public static void main(String[] args)
{
   A a = new A(); // keep as it is because it is from same package "P1".
    a.m1();
```

```
   com.P2.A a1 = new com.P2.A(); // It will direct go to P2 package and call the method m2.
    a1.m2;

   B b = new B();
    b.m3();
  }
}
```

Output:

```
Hi
Hello
Hello Java
```

Suppose you are not using public with m2() method in the above program, then it will give error ” The method m2() from the type A is not visible” because it is a default and default access modifier cannot be accessed from outside the package.

Alternatively if using import statemet

```
package com.P1;



import com.P2.A;



public class B

{

public static void main(String[] args) {



A obj=new A();

obj.m2();



com.P1.A obj_samepackage=new com.P1_A();
```

```
obj_samepackage.m1();



}



}
```

Q12. Write a java program to do the following:

A. Read a sentence from the user
B. Check if the user entered sentence has digits. If yes, Display a message" DIGIT FOUND" else then arrange the words of the given sentence in alphabetical order
C. Display the sorted words. (3)

SCHEME:
Read a sentence from the user - 0.5 mark
Check if the user entered sentence has digits. If yes, Display a message" DIGIT FOUND"- 1,5 marks
Display the sorted words – 1 mark

SAMPLE CODE :

```
package com.pack_1;
import java.util.Scanner;
public class SentenceProcsessingWithoutArrays {



//public class SentenceProcessing {
 public static void main(String[] args) {
 Scanner scanner = new Scanner(System.in);


 // Read a sentence from the user
 System.out.print("Enter a sentence: ");
 String inputSentence = scanner.nextLine();


 // Check if the sentence contains digits
```

```
if (containsDigits(inputSentence)) {
System.out.println("DIGIT FOUND");
} else {
// Split the sentence into words
String[] words = inputSentence.split("\\s+");


// Sort the words in alphabetical order
sortWordsAlphabetically(words);


// Display the sorted words
System.out.println("Sorted words:");
for (String word : words) {
System.out.println(word);
}
}


scanner.close();
}


// Function to check if a string contains digits
private static boolean containsDigits(String str) {
for (char c : str.toCharArray()) {
if (Character.isDigit(c)) {
return true;
}
}
return false;
}


// Function to sort an array of words alphabetically
private static void sortWordsAlphabetically(String[] words) {
for (int i = 0; i < words.length - 1; i++) {
for (int j = i + 1; j < words.length; j++) {
if (words[i].compareTo(words[j]) > 0) {
// Swap words[i] and words[j]
String temp = words[i];
words[i] = words[j];
words[j] = temp;
}
}
```

```
 }
 }
}
```

Q13. Write a program to print all the unique integers in a number. For instance, if the input number is "1232", the output will be the characters '1' and '3' as they are unique. The digit '2' repeats twice and so it will not be printed. The number is passed as command line argument. (3)

SCHEME:

Read a single input number from command line : 1 mark

individually store every digit in array using mod operation -1mark

Check for duplicate element as follows (1mark)

```
for(i=0; i<n; i++) {
ctr=0; for(j=0,k=n; j<k+1; j++)
{ /*Increment the counter when the search value is duplicate.*/
 if (i!=j)
{                    if(arr1[i]==arr1[j])
{ ctr++; } } }
if(ctr==0)
{ printf("%d ",arr1[i]);
 } }
```

Q14. Complete the given java code to display the properties of a given number. The properties are: isPerfectSquare, previousNumber, nextNumber (defined in the class named" Properties).

Please Note: The structure of the program given in the Question should not be altered

```
class Properties
{
boolean isPerfectSquare;
int previousNumber;
int nextNumber;
}

class DemoNumberProperties
```

{
//main method
public static void main(String s[])
{
Call the get_numberProperties method to return the class Properties object
}

// The get_numberPropertiesmethod should be defined here with suitable signatures
get_numberProperties method with suitable signatures
{
Here write the code to create Properties of class object.
Get the required properties of the input number and
Assign them to the Properties class object.
Also return the created object.
}

Expected Output:

For the input :25 the expected output is as follows:

The number is : 25
isPerfectSquare = true
previousNumber = 24
nextNumber = 26

(2)

SCHEME:

Defining the get_numberProperties method with suitable signatures---- 1mark (If definition is correct and also the syntax)
Calling the get_numberProperties method to return the class Properties object----------1mark(Marks awarded only if the work is done correctly and completely)

SAMPLE CODE:

```
import java.util.*;
import java.lang.*;
class Properties
{
boolean isPerfectSquare;
int previousNumber;
int nextNumber;
}
class DemoNumberProperties
{
public static void main(String[] agrs)
{
```

```
DemoNumberProperties obj1= new DemoNumberProperties();
Properties obj2;
obj2=obj1.get_numberProperties();
System.out.println("The number is:");
System.out.println("isPerfectSquare ="+obj2.isPerfectSquare);
System.out.println("previousNumber ="+obj2.previousNumber);
System.out.println("nextNumber ="+obj2.nextNumber);
}
static Properties get_numberProperties() {
Scanner in=new Scanner(System.in);
int n;
System.out.println("The input is:");
n=in.nextInt();
Properties obj=new Properties();
obj.previousNumber=n-1;
obj.nextNumber=n+1;
int sq=(int)Math.sqrt(n);
if((sq*sq)==n)
{obj.isPerfectSquare=true;}
return obj;
}
}
```

Q15. An election is contested by 5 candidates. The candidates are identified by numbering them 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a JAVA program to read the ballots, count and display the votes cast for each candidate along with the spoilt count, in case number read is outside the range 1-5. (4)

SCHEME:

Creation of suitable class with suitable data instance variables, constructors: 1 mark

method to read the ballots using the array of objects-1 mark

Method to count : 1 mark

Method to display the votes cast for each candidate with the spoilt count, in case number read is outside the range 1-5 – 1mark

Q16. Write a java program to do the following:

A. Define a class called Person with the following attributes and methods:

Name, DoB(date of birth), suitable overloaded constructors and a method to display the details of a Employee object.

B. Define a subclass "Employee " with Person as super class. The Employee class should have the following attributes and methods:
empID, dateofJoining, Salary, suitable overloaded constructors and a method to display the details of a Employee object.

C. Write suitable main method for the above defined Employee class to do the following
   i. Create an array of Employee Objects(3 employees).
   ii. Display the empID and the name of the Employees who are having 10 years of experience. (4)

SCHEME:

Correct class Person defined(With data instance variables , constructors & methods) - 1 mark

Correct class Employee defined(With data instance variables , constructors & methods) - 1 mark

Creation of an array(Size=3) of Employee class objects- 1 mark

Display the empID and the name of the Employees who are having 10 years of experience- 1 mark

Ans:

```
class Person{
   String Name;
   String DoB;
   Person(String name, String date)
   {
      Name = name;
      DoB = date ;
   }
   void display(){S.o.p("Name and DOB "+ Name +"  "+DoB);}
}

class Employee extends Person{
String empID;
int date, month, year ;     // or can store as dd/mm/year, then split the string based on / or substring of the DateOfjoining string can be retrived
int  Salary ;
```

```
Employee(Strinmg name, String date, int date, int month, int yeardate, String empID, int
Salary)
{
   super(name, date);
   this. empID = empID;
   this.date = date , this.month =  month, this.year =  year ;
   this.Salary = Salary ;
}
void display()
{
   super.display();
   S.o.p("Emp Id, dateofJoining, Salary" +empID+" "+ dateofJoining  +"  "+ Salary);
}
boolean getService(){
   if (year < 2013 ) return true
   else return false;
}
}

class Test {
   public static void main(String[] args) {
      Employee Emp_Obj[] = new Employee[3];
      String empID;
      int date1, month, year ;
      int  Salary ;
      for (int i =0; i<3; i++)
      {   System.out.println("Enter Employee details");
         // Code snippet to read all the Employee' data goes here
         Emp_Obj[i] = new Employee( name,  date,  date1,  month,  yeardate,  empID,
Salary);
         Emp_Obj[i].display();
```

```
        }
        for (int i =0; i<3; i++)
        {   System.out.println("Employees having 10 years of experience");
            if (Emp_Obj[i].getService() )
                System.out.println("Name and EmpId "+Emp_Obj[i].Name + Emp_Obj[i].empID) ;
        }
    }
}
```

Q17. Write a java program to print the elements of the matrix in Wave Order as shown below. The matrix can have different numbers of rows and columns. The matrix contents should be displayed using for-each loop construct.

(3)

SCHEME:

Matrix Declarartion & definition : 1 Mark

Print the elements of the matrix in Wave Order: 2 Marks (Correct Logic)

Sample Code which prints the elements of the matrix in Wave Order is given below:

```
import java.io.*;
import java.util.*;

public class Main{

public static void main(String[] args) throws Exception {
    // write your code here
    Scanner scn = new Scanner(System.in);
    int n = scn.nextInt();
    int m = scn.nextInt();
```

```
    int[][] mat = new int[n][m];

    //input the matrix
    for(int i=0;i<n;i++) {
        for(int j=0;j<m;j++) {
            mat[i][j] = scn.nextInt();
        }
    }

    for(int j=0;j<mat[0].length;j++) {
        if(j% 2 == 0) {
            for(int i=0;i<mat.length;i++) {
                System.out.print(mat[i][j] + " ");
            }
        } else {
            for(int i=mat.length-1;i>=0;i--) {
                System.out.print(mat[i][j] + " ");
            }
        }
        System.out.println();
    }
 }

}
```

Sample Output

Input:
1 2 3
4 5 6
7 8 9

Output:
1 4 7
8 5 2
3 6 9

Q18. Consider the code given :

A. Identify the error in the following code with proper justification.
B. Change the code to make it error free.
C. Write /Add the statements in the main method to access the printt() method of C class using runtime polymorphism..

```
class A {
            public void printt() {
                        System.out.println("Class A print method");
            }
```

```
}

class B extends A {
        public void printt() {
                System.out.println("Class B print method");
        }
}

class C extends A {
        public void printt() {
                System.out.println("Class C print method");
        }
}

class D extends A,B {
        public void printt() {
                System.out.println("Class D print method");
        }
}

class Main {

        public static void main(String args[]) {

                D obj = new D();
                obj.printt();
        }
}
```
(3)

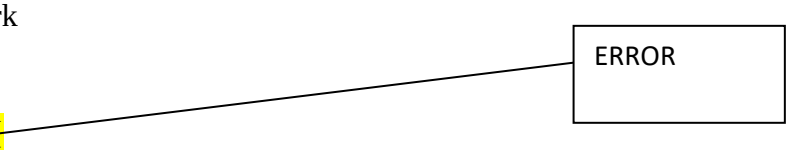
SCHEME:

Correct Error Identified ().5 marks)and explained with correct justification : (1.0 Mark)

Change the code to make it error free : 0.5 mark

Correct statements in the main method to access the printt() method of C class using runtime polymorphism: 1 Mark

ANSWER:




```
class D extends A,B {
        public void printt() {
                System.out.println("Class D print method");
        }
}
```

Java Does not support Multiple Inheritance. So the class D cannot extend 2 classes.

Correct Code Sample:

```
class A {
        public void printt() {
                System.out.println("Class A print method");
```

```
        }
}

class B extends A {
        public void printt() {
                System.out.println("Class B print method");
        }
}

class C extends A {
        public void printt() {
                System.out.println("Class C print method");
        }
}

class D extends A {
        public void printt() {
                System.out.println("Class D print method");
        }
}

class Main {

        public static void main(String args[]) {

                D obj = new D();
                obj.printt();
// access the printt() method of C class using runtime polymorphism
                A aref;
                 C cobj = new C();
                  aref =cobj;
                  aref.printt();
        }
}
```