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Based on ICSE 2024 EXAMINATION SOLUTION of QUESTION PAPER COMPUTER APPLICATIONS

(A reputed CISCE School's Q.P.)

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SECTION A

(MCQ and Subjective Questions.)

Question 1.

Choose the correct answers to the questions from the given options.

(i) Give the output of the following String methods:
"SUCESS".indexOf('S')+ "SUCESS".lastIndexOf('S')

(a) 0
(b) 5
(c) 6
(d) -5

Answer. (b) 5

Reason: Methods - indexOf('S') will results in 0 and lastIndexOf('S) will results in 5. Thus 0+5 = 5

(ii) A single dimensional array contains N elements. What will be the last subscript

(a)N
(b) N-1
(c) N-2
(d) N+1

Answer. (b) N-1

(Reason – Array index starts from 0 and ends at Size-1.)

(iii) Give the output of the following code:

```
String A="560", B="94.0";
double C = Double.parseDouble(A);
double D = Double.parseDouble(B);
System.out.println((C+D));
```

(a) 56094
(b) 654.0
(c) 56094.0
(d) 654

Answer. (b) 654.0

(Reason – Double.parseDouble(String) returns the double value. Thus, 560.0+94.0 = 654.0)

(iv) What will be the output of the following code?

```
System.out.println("Lucknow".substring(0,4));
```

(a)Lucknow
(b) Luckn
(c) Luck
(d) luck

Answer. (c) Luck

(Reason – substring(0,4) will extract the substring from index 0 to index 3.)

(v) Evaluate the following Java expression, if x=3, y=5, and z=10:

++z + y - y + z + x++

(a) 24
(b) 23
(c) 20
(d) 25

Answer. (d) 25

(Reason – Prefix increment operator first increments the value of z and then uses the value and the post-increment operator uses the value of x and then increments. Thus, 11+5-5+11+3 = 25)

(vi) What will be the output of the following program?

```
public class Test {
public static void main(String[] args) {
   int count = 1;
while (count <= 15) {
System.out.println(count % 2 == 1 ? "***" : "++++++");
++count;
   }     // end while
}     // end main
}
```

(a) 15 times ***
(b) 15 times +++++
(c) 8 times *** and 7 times +++++
(d) Both will print only once

Answer. (c) 8 times * and 7 times +++++**
(Reason – There are 8 odd numbers from 1 to 15 and 7 even numbers. Thus, *** will be printed 8 times for count at odd and ++++++ will be printed 7 for count at even.)

(vii) Automatic type conversion is possible in which of the following cases?

(a) Byte to Int
(b) Int to long
(c) Long to int
(d) Short to int

Answer. (c) Long to int

(Reason – Automatic type conversion or implicit conversion takes places from lower data type to higher data type only.)

(viii) If integer requires 4 bytes space then what will be the size of array: int array[3][4]?

(a) 24 bytes
(b) 12 bytes
(c) 48 bytes
(d) 11 bytes

Answer. (c) 48 bytes

(Reason – 4 x 3 x 4 = 48)

(ix) What is the return type of replace()?

(a) int

(b) Boolean

(c) char

(d) String

Answer. (d) String

(x) Which among the following is not true for the keyword "this"?

(a) only pertains to a class method
(b) is an implicit argument to "this" instance of the class
(c) is accessible inside of any instance method
(d) solves the ambiguity of similar variable names

Answer. (a) only pertains to a class method

(Reason – Rest all (b to c) are valid. Also, the 'this' keyword is associated with an instance of a class and not with the class members.)

(xi) Pick the odd one out:

(a) protected
(b) friendly
(c) public
(d) private

Answer. (b) friendly

(Reason-private, protected and the public are only the access specifiers specified whereas if no access specifier is declared, it is the friendly or the default access specifier gets associated with a class member.)

(xii) Identify the illegal identifier from the options given below:

(a) myvar
(b) $myvar
(c) MY var
(d) $$myvar

Answer. (c) MY var

(Reason – space is not allowed in naming an identifier.)

(xiii) If m,n,p are three integers, then which of the following holds true, if (m==n)&&(n!=p)?

(a) 'm' and 'n' are equal.
(b) 'n' and 'p' are equal.
(c) 'm' and 'p' are equal.
(d) 'p' and 'n' are equal.

Answer. (a) 'm' and 'n' are equal.

(Reason – From the above-given options, more likely option (a) seems correct answer.

(xiv) Assertion(A): A class is known as an object factory.
Reason(R): Objects are created from class which contains common attribute and behaviour.

(a) Both Assertion(A) and Reason(R) are true and Reason(R) is a correct explanation for Assertion (A).

(b) Both Assertion(A) and Reason(R) are true and Reason(R) is not a correct explanation for Assertion (A).

(c) Assertion(A) is true and Reason(R) is false.

(d) Assertion(A) is false and Reason(R) is true.

Answer. (a) Both Assertion and Reason are true and Reason is a correct explanation for Assertion.

(xv) The parameters that appear in the method call are called _____ parameters.

(a) Actual
(b) Formal
(c) Partial
(d) Both (a) & (b)

Answer. (b) Formal

(xvi) Predict the output:

```
public class Test
{ public static void main(String[] args)
        {       double data = 444.324;
                int value = data;
                System.out.println(data);
        }
}
```

(a) 444.324
(b) 444
(c) Runtime error
(d) Compilation error

Answer. (d) Compilation error

(Reason- double data type cannot be converted to int automatically.
If the statement was - int value = (int) data, then the answer would be 444.)

(xvii) Which one of the following is a Unary operator in Java?

(a) ( )
(b) *
(c) +
(d) ++

Answer. (d) ++

(xviii) Assertion(A): In Java more than one method can be created with the same name.
Reason(R): Java implements encapsulation that allows methods to be overloaded.

(a) Both Assertion(A) and Reason(R) are true and Reason(R) is a correct explanation for Assertion (A).
(b) Both Assertion(A) and Reason(R) are true and Reason(R) is not a correct explanation for Assertion (A).
(c) Assertion(A) is true and Reason(R) is false.
(d) Assertion(A) is false and Reason(R) is true.

Answer. (c) Assertion is true and Reason is false.

(Reason- Polymorphism is the feature for method overloading)

(xix) What is the length of an array when its first index is denoted by i and last index is denoted by j?

(a) i+j
(b) j-i-1
(c) j-i+1
(d) j-i

Answer. (c) j – i +1

(xx) Which of the following for loop declaration is not valid?

(a) for (int i = 99; i >= 0; i / 9)
(b) for (int i = 7; i <= 77; i += 7)
(c) for (int i = 20; i >= 2; - -i)
(d) for (int i = 2; i <= 20; i = 2* i)

Answer. (a) for (int i=99; i>=0; i/9)

(Reason- i/9 is an arithmetic statement and not a decremental statement.)

Question 2:

(i) Write the Java expression for the following:

(a) $\frac{ax^5+b}{cx+d^4}$

(b) πr^2

(ii) Define abstraction and encapsulation.

(iii) Differentiate between compareTo() and equals().

(iv) Differentiate between linear and binary search.(2 points)

Answer.

(i)
```
z = (a*Math.pow(x,5)+b)/(c*x+Math.pow(d,4));
ar = Math.PI*r*r;
```

(ii) Abstraction – the process in which essential elements are provided and non-essential elements are kept hidden.
Encapsulation – the process in which data members and methods are bound together into one single unit.

(iii) compareTo( ) returns int data type whereas equals( ) returns boolean data type.

(iv) Linear search can work on an unsorted array whereas binary search works only when the array is sorted.

Linear search is time-consuming for a larger size of array whereas binary search takes less time under the same condition.

(iv) Differentiate between ...

(v) Write the snippet to print 20 terms of the series 3n+2 but stop as soon as multiple of 4 is encountered.

(vi) What will be the output of the following code?

```
int m=2;
int n=15;
for(int i = 1; i<5; i++);
m++; --n;
System.out.println("m=" +m);
System.out.println("n="+n);
```

(vii) State true or false: "Class form the basis of all computation in Java". Support your answer with a reason.

Answer:

(v)

```
for(int i =1; i<=20; i++)
    {
        if(i%4==0)
          break;
        System.out.print(3*i+2);
    }
```

(vi) m=3
n=14

(Reason – for loop is an empty loop and does not affect m++ and –n. They are executed only one time.)

(vii) Class forms the basis of all computation in Java. The reason is as Java follows OOPS strictly, we cannot have anything outside a class.

(viii) Give the output of the following:

(a) Math.floor (-4.7)
(b) Math.ceil(3.4) + Math.pow(2, 3)

(ix) Evaluate (show calculation): a=mb*3/4+k/7+8-mb+18/8; (int a, mb=3, k=4).

(x) Predict the output and state the reason for your answer:
(If the code is incorrect then rewrite the correct code)

```
public class error
{
    public static void main(String[] args)
    {
            int $_=5;
            System.out.println($_++);
    }
}
```

Answer.

(viii) -5.0

12.0 (4.0+8.0)

(ix) a = (mb*3)/4 + (k/7) + 8 –mb + (18/8)
= (3*3)/4 + (4/7) + 8 – 3 + (18/8)
= 9/4 + 4/7 + 8 – 3 + 2
= 2 + 0 + 8 – 3 + 2
= 10 – 3 + 2 = 7 + 2 = 9

(x) 5

SECTION B

(Java Programming.)

Question 3 **[15]**

Design a class **RailwayTicket** with following description:

Instance variables/data members :

String name : To store the name of the customer

String coach : To store the type of coach customer wants to travel

long mobno : To store customer's mobile number

int amt : To store basic amount of ticket

int totalamt : To store the amount to be paid after updating the original amount

Member methods :

void accept () – To take input for name, coach, mobile number and amount.

void update() – To update the amount as per the coach selected

(extra amount to be added in the amount as follows)

void display() – To display all details of a customer such as

name, coach, total amount and mobile number.

Type of Coaches	Amount
First_AC	700
Second_AC	500
Third_AC	250
sleeper	None

Write a main method to create an object of the class and call the above member methods.

Solution:

```
import java.util.Scanner;
class RailwayTicket
{   String name, coach;
    long mobno;
    int amt, totalamt;
    public void accept()
    {   Scanner sc=new Scanner(System.in);
        System.out.print("Enter the name: ");
        name=sc.nextLine();
        System.out.print("Enter the type of coach - First_AC/Second_AC/Third_AC/Sleeper: ");
        coach=sc.next();
        System.out.println("Enter the mobile no. and basic amount");
        mobno=sc.nextLong();
        amt=sc.nextInt();
    }
   public void update()
    {   if(coach.equals("First_AC"))
            totalamt=amt+700;
        else if(coach.equals("Second_AC"))
            totalamt=amt+500;
        else if(coach.equals("Third_AC"))
            totalamt=amt+250;
        else
            totalamt=amt;
    }
```

```
    public void display()
    {  System.out.println("Name of the customer:"+name);
       System.out.println("Type of coach:"+coach);
       System.out.println("Total amount:"+totalamt);
       System.out.println("Mobile number:"+mobno);
    }
    public static void main(String ar[])
    {   RailwayTicket Rot=new RailwayTicket();
       Rot.accept();
       Rot.update();
       Rot.display();
    }
}
```

```
Enter the name: Rajdeep Das
Enter the type of coach - First_AC/Second_AC/Third_AC/Sleeper:   First_AC
Enter the mobile no.and basic amount
9876543200
2500
Name of the customer:Rajdeep Das
Type of coach:First_AC
Total amount:3200
Mobile number:9876543200
```

Question 4 **[15]**

Write a program to input a number, check and print whether it is a **Pronic** number, duck number or none.

(Pronic number is the number which is the product of two consecutive integers)

Examples: $12 = 3 \times 4$

$20 = 4 \times 5$

$42 = 6 \times 7$

A Duck number is a number which has zeroes present in it, but there should be no zero present in the beginning of the number (For example 32010)

Solution:

```
import java.util.Scanner;
class NumberProgram
{
   public static boolean pronicCheck(int a)
   {
      for(int i=1;i<=a/2;i++)
      {
         if(i*(i+1)==a)
         return true;
      }
      return false;
   }

   public static boolean duckCheck(int a)
   {
      while(a>0)
      {
         if(a%10==0)
         return true;
         a=a/10;
      }
      return false;
   }

   public static void main(String ar[])
   {
      Scanner sc=new Scanner(System.in);
      System.out.println("Enter a positive number");
      int n=Math.abs(sc.nextInt());
      if(pronicCheck(n))
      System.out.println("It is a Pronic number");
      else if(duckCheck(n))
      System.out.println("It is a Duck number");
      else
      System.out.println("None of them");
   }
}
```

```
Enter a positive number
12
It is a Pronic number
Enter a positive number
103
It is a Duck number
Enter a positive number
17
None of them
```

[15]

Question 5

Design a class to overload a function volume() as follows:

(i) double volume (double R) – with radius (R) as an argument, returns the volume of sphere using the formula.

$V = 4/3 \times 22/7 \times R^3$

(ii) double volume (double H, double R) – with height(H) and radius(R) as the arguments, returns the volume of a cylinder using the formula.

$V = 22/7 \times R^2 \times H$

(iii) double volume (double L, double B, double H) – with length(L), breadth(B) and Height(H) as the arguments, returns the volume of a cuboid using the formula.

$V = L \times B \times H$

Solution:

```
class Overload
{
   double volume(double R)
   {
      return (4.0/3.0)*(22.0/7.0)*Math.pow(R,3);
   }
   double volume(double H, double R)
   {
      return (22.0/7.0)*Math.pow(R,2)*H;
   }
   double volume(double L, double B, double H)
   {
      return L*B*H;
   }
   public static void main()
   {
      Overload ob=new Overload();
      System.out.println("Volume of Sphere:"+ob.volume(5));
      System.out.println("Volume of Cylinder:"+ob.volume(5,3));
      System.out.println("Volume of Cuboid:"+ob.volume(5,3,2));
   }
}
```

```
Volume of Sphere:523.8095238095237
Volume of Cylinder:141.42857142857142
Volume of Cuboid:30.0
```

[15]

Question 6

Write a program in Java to input a 4x4 array and find the maximum element from the left diagonal and minimum element from the right diagonal. Display the 2D array along with the elements.

Solution:

```
import java.util.Scanner;
class Array2D
{
   public static void main(String ar[])
   {
      Scanner sc=new Scanner(System.in);
      int arr[][]=new int[4][4];
      int i,j;
      System.out.println("Enter the 4x4 elements for the array");
      for(i=0;i<4;i++){
         for(j=0;j<4;j++){
            arr[i][j]=sc.nextInt();
         }
      }
      int max=arr[0][0];
      int min=arr[0][3];
      for(i=0;i<4;i++){
         for(j=0;j<4;j++){
            if(i==j&&arr[i][j]>max)
            max=arr[i][j];
            if(i+j==3&&arr[i][j]<min)
            min=arr[i][j];
         }
      }
```

```
for(i=0;i<4;i++){
        for(j=0;j<4;j++){
           System.out.print(arr[i][j]+" ");
        }
        System.out.println();
     }
     System.out.println("Maximum element from left diagonal::"+max);
     System.out.println("Minimum element from right diagonal::"+min);
  }
}
```

```
Enter the 4x4 elements for the array
1 2 3 4
4 5 6 7
6 7 8 9
9 8 7 6
1       2       3       4
4       5       6       7
6       7       8       9
9       8       7       6
Maximum element from left diagonal::8
Minimum element from right diagonal::4
```

[15]

Question 7

Write a program in Java to enter a sentence. Display the words which are only palindrome.

Sample Input: MOM AND DAD ARE NOT AT HOME

Sample Output: MOM DAD

Solution:

```
import java.util.Scanner;
class Palindromes
{    public static void main(String ar[])
     {  Scanner sc=new Scanner(System.in);
        System.out.println("Enter a string");
        String str=sc.nextLine().toUpperCase().trim()+" ";
        int len=str.length();
        String wrd="";
        for(int i=0;i<len;i++)
        {   char ch=str.charAt(i);
            if(ch!=' ')
                wrd+=ch;
            else{
                String res="";
                for(int j=0;j<wrd.length();j++)
                    res=wrd.charAt(j)+res;
                if(res.equals(wrd))
                    System.out.print(wrd+" ");
                wrd="";
            }
        }
    }
}
```

```
Enter a string
MOM AND DAD ARE NOT AT HOME
MOM DAD
```

Question 8 **[15]**

Write a program to input an array from user of size n and search for an element in the array using Binary search. (Note: The user might not enter the array elements in sorted order)

Solution:

```
import java.util.Scanner;
class BinarySearch
{
   public static void main()
   {
      Scanner sc=new Scanner(System.in);
      System.out.print("Enter the size of the array: ");
      int n=sc.nextInt();
      int arr[]=new int[n];
      System.out.println("Enter the elements for the array");
      for(int i=0;i<n;i++)
         arr[i]=sc.nextInt();
      //sorting the array using bubble sort
      for(int i=0; i<n-1; i++)
      {
         for(int j=0; j<n-1-i; j++)
         {
            if(arr[j]>arr[j+1])
            {   int t=arr[j];
               arr[j]=arr[j+1];
               arr[j+1]=t;
            }
         }
      }
```

```
    for(int i=0; i<n; i++)
        System.out.print(arr[i]+" ");
    int lb=0, ub=n-1, mid=0;
     System.out.print("Enter the number to search: ");
     int p=sc.nextInt();
     while(lb<=ub)
     {
        mid=(lb+ub)/2;
        if(arr[mid]==p)
        break;
        else if(arr[mid]>p)
        ub=mid-1;
        else
        lb=mid+1;
     }
     if(lb>ub)
     System.out.println("No. not found in the array");
     else
     System.out.println("No. found at "+mid+" position");
   }
}
```

```
Enter the size of the array: 5
Enter the elements for the array
10 13 12 15 14
10 12 13 14 15
Enter the number to search: 15
No. found at 4 position
```

Thank You

For patience watching

&

All the best for your examinations.