ICSE BOARD EXAMINATION
COMPUTER APPLICATIONS
Solved Paper - 2023
Class-10th

Maximum Marks: 100

Time allowed: Two hours

Answer 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.

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*This Paper is divided into **two** Sections.*

*Attempt **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 **Section**.)*

Question 1

Choose the correct answers to the questions from the given options. [20]

(Do not copy the questions, write the correct answers only.)

(i) A mechanism where one class acquires the properties of another class;
- **(a)** Polymorphism
- **(b)** Inheritance
- **(c)** Encapsulation
- **(d)** Abstraction

(ii) Identify the type of operator &&:
- **(a)** ternary
- **(b)** unary
- **(c)** logical
- **(d)** relational

(iii) The Scanner class method used to accept words with space:
- **(a)** `next()`
- **(b)** `nextLine()`
- **(c)** `next()`
- **(d)** `nextString()`

(iv) The keyword used to call package in the program:
- **(a)** extends
- **(b)** export
- **(c)** import
- **(d)** package

(v) What value will Math.sqt (Math. ceil (15.3)) return?
- **(a)** 16.0
- **(b)** 16
- **(c)** 4.0
- **(d)** 5.0

(vi) The absence of which statement leads to fall through situation in which case statement?
- **(a)** continue
- **(b)** break
- **(c)** return
- **(d)** System. exit(0)

(vii) State the type of loop in the given program segment:
```
for (int i = 5;i! = 0; i - = 2
System.out.println(i);
```
- **(a)** finite
- **(b)** infinite
- **(c)** null
- **(d)** fixed

(viii) Write a method prototype name `check()` which takes an integer argument and returns a char:
- **(a)** `char check()`
- **(b)** `void check (int x)`
- **(c)** `check (int x)`
- **(d)** `char check (int x)`

(ix) The number of values that a method can return is:
- **(a)** 1
- **(b)** 2
- **(c)** 3
- **(d)** 4

(x) Predict the output of the following code snippet: String `P = "20",Q = "22"`.

```
int a = Integer.parseIntP);
int b = Integer.valueOf(Q);
System.out.println(a + "" + b);
```

   (a) 20   **(b)** 20 22
   (c) 2220   **(d)** 22

(xi) The String class method to join two strings is:
   (a) `concat(String)`   **(b)** `<string>.joint(string)`
   (c) `concat(char)`   **(d)** `Concat()`

(xii) The output of the function "COMPOSITION".substring (3, 6):
   (a) POSI   **(b)** POS
   (c) MPO   **(d)** MPOS

(xiii) int x = (int) 32.8; is an example of .... typecasting.
   (a) implicit   **(b)** automatic
   (c) explicit   **(d)** coercion

(xiv) The code obtained after compilation is known as:
   (a) source code   **(b)** object code
   (c) machine code   **(d)** java byte code

(xv) Missing a semicolon in a statement in what type of error?
   (a) Logical   **(b)** Syntax
   (c) Runtime   **(d)** No error

(xvi) Consider the following program segment and select the output of the same

```
when n = 10:
switch(n)
(case 10: System.out.println(n*2);
case 4: System.out.println(n*4); break;
default: System.out.println(n);
}
```

   (a) $\begin{matrix}20\\40\end{matrix}$ **(b)** $\begin{matrix}10\\4\end{matrix}$

   (c) 20, 40   **(d)** $\begin{matrix}10\\10\end{matrix}$

(xvii) A method which does not modify the value of variables is termed as:
   (a) Impure method   **(b)** Pure method
   (c) Primitive method   **(d)** User defined method

(xviii) When an object of a Wrapper class is converted to its corresponding primitive data type, it is called as ....
   (a) Boxing   **(b)** Explicit type conversion
   (c) Unboxing   **(d)** Implicit type conversion

(xix) The number of bits occupied by the value 'a' are:
   (a) 1 bit   **(b)** 2 bits
   (c) 4 bits   **(d)** 16 bits

(xx) Method which is a part of a class rather than an instance of the class is termed as:
   (a) Static method   **(b)** Non static method
   (c) Wrapper class   **(d)** String method

Question 2

(i) Write the Java expression for $(a + b)^x$.   **[2]**

(ii) Evaluate the expression when the value of x = 4:   **[2]**

```
x* = - - x + x + + + x
```

(iii) Convert the following do... while loop to for loop: **[2]**

```
int x = 10;
do
(x = -;
System.out.print(x);
}while (x > = 1);
```

(iv) Give the output of the following Character class methods: **[2]**
   (a) Character. to Upper Case('*a*')
   (b) Character. is Letter Or Digit ('#')

(v) Rewrite the following code using the if-else statement: **[2]**

```
int m = 400;
double ch = (m > 300)? (m/10.0)*2: (m/20.0)-2;
```

(vi) Give the output of the following program segment: **[2]**

```
int n = 4279; int d;
while(n>0)
{d = n%10;
System.out.println(d);
n = n/100;
}
```

(vii) Give the output of the following String class methods: **[2]**
(a) "COMMENCEMENT". last IndexOf ('M')
(b) "devote".compareTo ("DEVOTE")

(viii) Consider the given array and answer the questions given below: **[2]**
```
int x[] = {4,7,9,66,72,0,16};
```
(a) What is the length of the array?
(b) What is the value in x[4]?

(ix) Name the following: **[2]**
(a) What is an instance of the class called?
(b) The method which has same name as that of the class name.

(x) Write the value of *n* after execution: **[2]**
```
char ch = 'd';
int n = ch + 5;
```

Section-B

(60 Marks)

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

The answers in this section should consist of the programs in either Blue J environment or any program environment with java as the base.

Each program should be written using variable description mnemonic codes so that the logic of the program is clearly depicted.

Flowcharts and algorithms are not required.

Question 3 **[15]**

Design a class with the following specifications:

Class name:	**Student**
Member variables:	name - name of student
	age - age of student
	mks - marks obtained
	stream - stream allocated
	(Declare the variables using appropriate data types)

Member methods:
void **accept()** - Accept name, age and marks using methods of Scanner class.
void **allocation()**- Allocate the stream as per following criteria:

mks	stream
> = 300	Science and Computer
> = 200 and < 300	Commerce and Computer
> = 75 and 200	Arts an Animation
< 75	Try Again

void **print()** - Display Student name, age, mks and stream allocated.

Call all the above methods in main method using an object.

Question 4 **[15]**

Define a class to accept 10 characters from a user. Using bubble sort technique arrange them in ascending order. Display the sorted array and original array.

Question 5   **[15]**

Define a class to overload the function print as follows:

```
void print()
```
to print the following format

1 1 1 1

2 2 2 2

3 3 3 3

4 4 4 4

5 5 5 5

```
void print(int n)
```
To check whether the number is a lead number. A lead number is the one whose sum of even digits are equal to sum of odd digits.

e.g. 3669   odd digits sum = 3 + 9 = 12

                even digits sum = 6 + 6 = 12

3669 is a lead number.

Question 6   **[15]**

Define a class to accept a String and print the number of digits, alphabets and special characters in the string.

Example: S = "KAPILDEV@83"

Output: Number of digits – 2

                Number of Alphabets – 8

                Number of Special characters – 1

Question 7   **[15]**

Define a class to accept values into on array of double data type of size 20. Accept a double value from user and search in the array using linear search method. If value is found display message "Found" with its position where it is present in the array. Otherwise display message "not found".

Question 8   **[15]**

Define a class to accept values in integer array of size 10. Fin sum of one digit number and sum of two digit numbers entered. Display them separately.

Example: Input: a[ ] = [2, 12, 4, 9, 18, 25, 3, 32, 20, 1]

                Output: Sum of one digit numbers : 2 + 4 + 9 + 3 + 1 = 19

                        Sum of two digit numbers : 12 + 18 + 25 + 32 + 20 = 107

■■■

ANSWERS

Answer 1

(i) **Option (b) is correct.**
Explanation: Inheritance is the property to share one class with other class in objects oriented programming.

(ii) **Option (c) is correct.**
Explanation: Logical operator && represent AND operation in a condition.

(iii) **Option (b) is correct.**
Explanation: Using nextLine() method of Scanner class we can accept string containing blank space.

(iv) **Option (c) is correct.**
Explanation: import keyword is used to import any package in java.

(v) **Option (c) is correct.**
Explanation: Math.ceil (15.3) will return 16.0 and Math.sqrt (16.0) will return the square root value of 16.0 which is 4.0

(vi) **Option (b) is correct.**
Explanation: After each case of switch block break statement should be there. If break statement is missing then control falls to the next case. This situation is known as fall through.

(vii) **Option (b) is correct.**
Explanation: Here value of I always not equals to zero. For this reason loop will never terminates.

(viii) **Option (d) is correct.**
Explanation: In option (d) return type is char and the argument is int type variable.

(ix) **Option (a) is correct.**
Explanation: A method can return only a single value. Method may not return any value from function body. For those case return type should be void.

(x) **Option (c) is correct.**
Explanation: In the print statement, a+""+b having no space in between but the computation occurring here is concatenation.

(xi) **Option (a) is correct.**
Explanation: contact(String) will contact the argument String with the invoking String object.

(xii) **Option (b) is correct.**
Explanation: Extract substring from the index 3 to index 5.

(xiii) **Option (c) is correct.**
Explanation: Explicit type casting is a method to convert a data type to the lower size data type. Here double data converted to int type data. double is 8 bytes and int is 4 bytes.

(xiv) **Option (d) is correct.**
Explanation: After compilation java code will be converted to a binary code which is known as byte code, which will interpret by JVM.

(xv) **Option (b) is correct.**
Explanation: Missing semicolon (;) after a java statement is noticed when the program was compiled using java compiler. This type of error known as syntax error.

(xvi) **Option (a) is correct.**
Explanation: Here value of n is 10. Control goes to case 10 and print 20. After that no break statement is there. So fall through will occurs and case 4 will execute. So after 20 in the next line 40 will be printed.

(xvii) **Option (b) is correct.**
Explanation: Pure function does not change the value of a variable. This type of function works on the principle of call by value.

(xviii) **Option (c) is correct.**
Explanation: Unboxing is the process to convert any wrapper type object into its corresponding primitive type.
```
E.g. Integer n = new Integer(25);
int m = n;
```

(xix) **Option (d) is correct.**
Explanation: char type data occupies 2 bytes of storage. Which is equals to 16 bits.

(xx) **Option (a) is correct.**
Explanation: Static method will be the part of a class. When we are create an object it will not the instantiate with the object.

Answer 2

  (i) double d = Math.pow((a+b),x);

  (ii) $x = 4$

     $x * = -x + x++ + x$

     $x = x * (-x + x++ + x)$

     $x = 4 * (3 + 3 + 4)$

     $x = 4 * 10$

     $x = 40$

     After evaluation value of x will be 40.

  (iii)
```
for(int x = 10; x>=1;)
{
x-;
System.out.println(x);
}
```

  (iv) (a) A

       (Explanation: Character.toUpperCase method convert a character in lowercase to uppercase)

     (b) False

       (Explanation: isLetterOrDigit method checks whether the character is a letter or a digit. If so it return true otherwise return false.)

  (v)
```
int m =400;
double ch=0.0;
if(m>300)
{
ch=(m/10.0)*2;
}
else
{
ch=(m/20.0)-2;
}
```

  (vi)
```
n = 4279
Working:
(4279)-> d = 9 -> n = n/100 -> print = 9 -> n = 42
(42) -> d = 2 -> n = n/100 -> print = 2 -> n = 0
Output:
9
2
```

  (vii) (a) 8

       (Explanation: from and character M present at the 8 index.)

     (b) 32

       (Explanation: ASCII difference of the character 'd' and 'D' is 32)

  (viii) (a) Length of the array is 7.

     (b) Value is 72

  (ix) (a) Instance of a class called object.

     (b) This type of methods is known as constructor.

  (x) Value of n will be 105.

     (Explanation: ASCII of 'd' is 100. Value of n = 100 + 5)

Answer 3
```
import java.util.Scanner
public class Student
{
    String name;
    int age;
    int mks;
```

```java
        String stream;
public void accept(){
    Scanner sc=new Scanner(System.in);
    System.out.println("Enter name of the student:);
    name=sc.nextLine();
    System.out.println("Enter age");
    age=sc.nextInt();
    System.out.println("Enter marks");
    mks=sc.nextInt();
}
public void allocation(){
    if(mks>=300){
        stream = "Scient and Computer";
    }
    else if (mks>=200){
        stream="Commerce and Computer";
    }
    else if(mks>=75){
        stream="Arts and Animation";
    }
    else{
        stream="Try again";
    }
}
public void print(){
    System.out.println("Name: "+name);
    System.out.println("Age: "+age);
    System.out.println("Marks obtained: "mks);
    System.out.println("Stream: "+stream);
}
Public static void main(String args[]){
        Student obj=new Student();
        obj.accept();
        obj.allocation();
        obj.print();
    }
}
```

Answer 4

```java
import java.util.Scanner;
public class CharacterSort {
    char[] arr=new char[10];
public void input(){
    Scanner sc=new Scanner(System.in);
    System.out.printIn("Enter 10 characters into an array:");
    for(int i=0;i<10;i++){
        arr[i]=sc.next().trim().charAt(0);
    }
}
public void arrange(){
    for(int i=0;i<9;i++){
        for(int j=0;j<9;j++){
            if(arr[j]>arr[j+1]){
                char temp=arr[j];
```

```
                    arr[j]=arr[j+1];
                    arr[j+1]=temp;
                }
            }
        }
    }
    public void display(){
        for(int i=0;i<10;i++){
            System.out.print(arr[i]+"/t");
        }
    }
    public static void main(String args[]) {
        CharacterSort obj=new CharacterSort();
        obj.input();
        System.out.println("Original array:");
        obj.display();
        obj.arrange();
        System.out.println("\nSorted array:");
        obj.display();
    }
}
```
//the program can also be done in one main()method and object creation is not necessary.

Answer 5

```
import java.util.Scanner;
public class Overload{
    public void print(){
        for(int i=1;i<=5;i++){
            for(int j=1;j<=5;j++){
                System.out.print(i+"");
            }
            System.out.println();
        }
    }
    public void print(int n){
        int sum1=0,sum2=0;
        int copy=n;
        while(n>0){
            int r=n%10;
            n=n/10;
            if(r%2==0)
                sum1+=r;
            else sum2+=r;
        }
        if(sum1==sum2)
            System.out.println(copy+" is a lead number");
        else
            System.out.println(copy+"is not a lead number");
    }
    public static void main(String args[]){
        Overload obj = new Overload();
        Scanner sc=new Scanner(System.in);
        System.Out.println("Enter a number");
        int n=sc.nextInt();
```

```
            obj.print();
            obj.print(n);
        }
    }
    //main method is not compulsory in case of function overloading.
```

Answer 6

```
    import java.util.Scanner;
    public class CountCharacter{
        String str;
        public void input(){
            Scanner sc=new Scanner(System.in);
            System.out.printIn("Enter a string");
            str=sc.nextLine();
        }
        public void display(){
            int numdigit=0;
            int numalpha=0;
            int numspl=0;
            for(int i=0;i<str.length();i++){
                char ch=str.charAt(i);
                if(Character.isDigit(ch))
                    numdigit++;
                else if(Character.isLetter(ch))
                    numalpha++;
                else
                    numspl++;
            }
            System.out.println("Number of digits="+numdigit);
            System.out.println("Number of Alphabets="+numalpha);
            System.out.println("Number of Special characters="+numspl);
        }
        public static void main(String args[]){
            CountCharacter obj=new CountCharacter();
            obj.input();
            obj.display();
        }
    }
    //the program can also be done in one main() method and object creation is not necessary.
```

Answer 7

```
    import java.util.Scanner;
    public class CountCharacter{
        double[]arr=new double[20];
        Scanner sc=new Scanner(System.in);
        public void input(){
            System.out.println("Enter 20 numbers");
            for(int i=0;i<20;i++){
                arr[i]=sc.nextDouble();
            }
        }
        public void search(){
            System.out.println("Enter a number for search:");
```

```
            double n=sc.nextDouble();
            boolean found=false;
            int pos=-1;
            for(int i=0;i<20;i++){
               if(arr[i]==n){
                  found=true;
                  pos=i;
                  break;
               }
            }
            if(found==true){
               System.out.println("Number is found into the array at "+pos+" position");
            }
            else{
               System.out.println("Number not found!");
            }
        }
        public static void main(String args[]){
            LinearSearch obj=new LinearSearch();
            obj.input();
            obj.search();
        }
    }
```

\\the program can also be done in one main() method and object creation is not necessary.

Answer 8

```
    import java.util.Scanner;
    public class SumDigit {
        int[] arr=new int[10];
        public void input(){
            Scanner sc=new Scanner(System.in);
            System.out.println("Enter 10 numbers");
            for(int i=0;i<10;i++){
               arr[i]=sc.nextInt();
            }
        }
        public void calculate(){
            int sum1=0;
            int sum2=0;
            for(int i=0;i<10;i++){
               if(arr[i]>=0 && arr[i]<=9){
                  sum1+=arr[i];
               }
               else if(arr[i]>=10 && arr[i]<=99){
                  sum2+=arr[i];
               }
            }
            System.out.println("Sum of one digit numbers: "+sum1);
            System.out.println("Sum of two digit numbers: "+sum2);
        }
```

```
    public static void main(String args[]){
       SumDigit obj=new SumDigit();
       obj.input();
       obj.calculate();
    }
}
\\the program can also be done in one main() method and object creation is not necessary.
```

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