ICSE 2025 EXAMINATION

Sample Question Paper – 4

Computer Applications

Time: 2 Hours **Max. Marks: 100**

General Instructions:

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. This Paper is divided into two Sections.
6. Attempt all questions from Section A and any four questions from Section B.
7. The intended marks for questions or parts of questions are given in brackets [ ].

SECTION A

Attempt all questions from this part.

QUESTION 1.
Choose the correct answer and write the correct option.

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

(i) A benefit of encapsulation is ____.
(a) The interface of the class will be smaller.
(b) The implementation can be changed without altering programs that use the class.
(c) The implementation of the class will be smaller.
(d) The interface can be changed without modifying programs that use the class.

Answer: (b) The implementation can be changed without altering programs that use the class.

(ii) Which of the following is a program or set of programs that converts source code into byte code?
(a) Java Source Code (b) Interpreter
(c) Byte code (d) Java Compiler

Answer: (d) Java Compiler

(iii) It is a composite data type because it requires to use its attributes.

(a) Array (b) Object
(c) Integer (d) Class

Answer: (d) Class

(iv) Which is not a true statement about array?

(a) An array expands automatically when it is full.
(b) An array is allowed to contain duplicate values.
(c) An array understands the concept of ordered elements.
(d) An array uses a zero index to reference the first element.

Answer: (a) An array expands automatically when it is full.

(v) Determine the output of the following functions.

```
String x="Computer";
String y="Applications";
System.out.println(x.indexOf(x.
                        charAt(4)));
```

(a) 4 (b) 5
(c) 3 (d) 2

Answer: (a) 4

(vi) What is the final value stored in variable x?

```
double x = Math.ceil(Math.
                     abs(- 7.3)):
```

(a) 7.0 (b) 8.0
(c) 6.0 (d) 9.0

Answer: (b) 8.0

(vii) Determine the output of the following code segment.

```
String myStr1 = "Hello";
String myStr2 = "Hello";
System.out.println(myStr1.
              compareTo(myStr2));
```

(a) 11 (b) 2
(c) 3 (d) 0

Answer: (d) 0

(viii) These statements can be used to modify the behavior of conditional and iterative statements.

(a) Switch statements
(b) Iterative statements
(c) Selection statements
(d) Jump statements

Answer: (d) Jump statements

(ix) An array is a _____ data type.

(a) Integer
(b) String
(c) Composite
(d) Mixed

Answer: (c) Composite

(x) Which of the following methods can be used to join two strings?

(a) Concat( )
(b) Concatenate( )
(c) Trim( )
(d) Join( )

Answer: (a) Concat( )

(xi) Which of the following concept can be used for encapsulation?

(a) Using interfaces
(b) Hiding data and internal methods using access modifiers in a class
(c) Wrapping data fields with methods
(d) All of the above

Answer: (d) All of the above

(xii) Variables that are shared by every instances of a class are_____.

(a) Public variables
(b) Private variables
(c) Instance variables
(d) Class variables

Answer: (d) Class variables

(xiii) In Java, a library of classes is called____.

(a) An application
(b) A package
(c) A directory
(d) A folder

Answer: (d) A folder

(xiv) How many types of print statements are there in Java?

(a) 2
(b) 3
(c) 4
(d) 5

Answer: (a) 2

(xv) The order of the three top level elements of Java source file is

(a) Import, package, class
(b) Class, import, package
(c) Package, import, class
(d) Any order

Answer: (c) Package, import, class

(xvi) The keyword to create an object of a class is

(a) create
(b) new
(c) New
(d) NEW

Answer: (c) New

(xvii) Assertion (A) : Pure functions define a relationship between input and output.
Reason (R) : A pure function does not depend on any state beyond its local scope.

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

(xviii) Read the following text and choose the correct answer:
In Java, a constructor is used to create an instance of a class. Constructors are similar to methods but differ in two ways: they have the same name as the class and no return type. Constructors are often called special methods, as they initialize an object when it's created.

Which of the following is true about constructor?

(a) It can contain return type.
(b) It can take any number of parameters.
(c) It can have any non- access modifiers.
(d) It cannot throw an exception.

Answer: (b) It can take any number of parameters.

(xix) Assertion (A) : static methods can only call static method within from them.
Reason (R) : static methods can refer this and super.

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

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

(xx) To declare a method in Java, choose the required components.

(a) Modifier (b) Return type
(c) Method name (d) All of these

Answer: (d) All of these

QUESTION 2.

(i) Write down the two purposes of + operator in Java.

Answer: In Java, the + operator serves two purposes:

1. **Arithmetic addition:** It adds numerical values (e.g., 5 + 3 results in 8).
2. **String concatenation:** It joins two strings or a string with other data types (e.g., "Hello" + " World" results in "Hello World").

(ii) Obtain the output of the following code in Java.

```
int x=0;
while(x<=1)
{
   System.out.println("x\n");
   x=x+1;
}
```

Answer:

```
Output  x
        x
```

(iii) What happens, if we do not include break statement with a case in switch statement?

Answer: If a **break** statement is not included in a **switch** case, execution will "fall through" to the next case, meaning the code in the following case(s) will also execute.

(iv) What will be the value of variables m and n after the execution of the following code?

```
int m, n=0;
for(m=1; m<=4; m++)
{
    n+ = m;
    n--;
}
```

Answer:

Value of m is 5.
Value of n is 5.

(v) Write the corresponding Java expression for the following mathematical expression :

$$z = x^3 + y^2 - \frac{\sqrt{xy}}{2}$$

Answer:

```
float z=x*x*x+y*y-(Math.sqrt(x*y))/2;
```

(vi) Find the value of following statements :

(a) Math.floor(1.9);
(b) Math.round(4.5);

Answer: (a) 1.0 (b) 5

(vii) The following code has some error(s). Rewrite the correct code and underlining all the correction made :

```
float m=6, float n=1, p=1;
do;
{
    p==p*n;
    n++;
while(n<=m);
System.out.print(" "+p);
}
```

Answer:

The correct code is

```
float m=6, n=1, p=1;
do
{
  p=p*n;
  n++;
}
while(n<=m);
System.out.print(" "+p);
```

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

```
String s = "Madam";
System.out.println(s.indexOf('d'));
System.out.println(s.lastIndexOf
                                ('m'));
```

Answer:

Output 2

4

(ix) Given the following set of identifiers

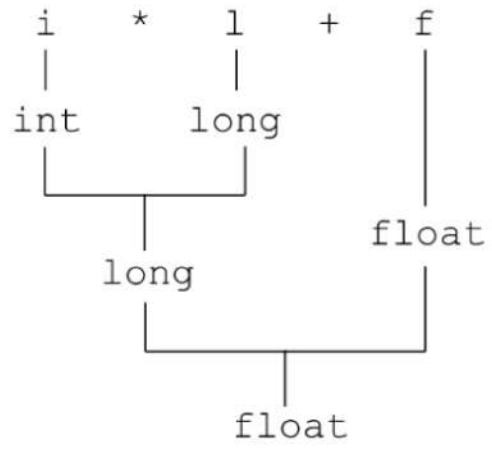
char c; byte b;

int i; short s;

long l; float f;

Identify the data type of i*l+ f expression.

Answer:



So, the data type of given expression is float.

(x) Rewrite the following program code using if-else statement :

```
int a = 2;
switch(a)
{
  case 0:
    GrandTotal=0.10*BillAmt;
    break;
  case 1:
    GrandTotal=0.9*BillAmt;
    break;
case 2:
    GrandTotal=0.8*BillAmt;
    break;
default:
    GrandTotal=BillAmt;
}
```

Answer:

```
int a = 2;

if (a == 0) {
    GrandTotal = 0.10 * BillAmt;
} else if (a == 1) {
    GrandTotal = 0.9 * BillAmt;
} else if (a == 2) {
    GrandTotal = 0.8 * BillAmt;
} else {
    GrandTotal = BillAmt;
}
```

SECTION B

Attempt any four questions from this section.

QUESTION 3.

Write a Java program to enter a number and check whether entered number is Pronic number or not.

Pronic number is the number which is the product of two consecutive integers.

e.g. $110 = 10*11$

$56 = 7*8$

$12 = 3*4$

Answer:

```
import java.util.Scanner;

public class PronicNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = scanner.nextInt();

        boolean isPronic = false;
        for (int i = 0; i <= Math.sqrt(num); i++) {
            if (i * (i + 1) == num) {
                isPronic = true;
                break;
            }
        }
        if (isPronic) {
            System.out.println(num + " is a pronic number");
        } else {
            System.out.println(num + " is not a pronic number");
        }
        scanner.close();
    }
}
```

QUESTION 4.

Design a class Perfect to check, if a given number is a perfect number or not. [A number is said to be perfect, if sum of the factors of the number excluding itself is equal to the original number]

For example 6 = 1 + 2 + 3; where 1, 2 and 3 are factors of 6, excluding itself.

Answer:

```java
import java.util.Scanner;

public class Perfect {

    // Method to check if a number is perfect
    public static boolean isPerfectNumber(int number) {
        int sum = 0;

        // Loop through all possible divisors from 1 to number/2
        for (int i = 1; i <= number / 2; i++) {
            if (number % i == 0) { // Check if i is a divisor
                sum += i; // Add the divisor to the sum
            }
        }

        // A number is perfect if the sum of its divisors equals the number itself
        return sum == number;
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number to check if it is a perfect number: ");
        int number = scanner.nextInt(); // Read user input

        // Check and display whether the number is perfect or not
        if (isPerfectNumber(number)) {
            System.out.println(number + " is a perfect number.");
        } else {
            System.out.println(number + " is not a perfect number.");
        }

        scanner.close(); // Close the scanner resource
    }
}
```

QUESTION 5.

Write a Java program to remove duplicate elements from an array.

Answer:

```java
public class RemoveDuplicates {
    public static int[] removeDuplicates(int[] arr) {
        if (arr == null || arr.length <= 1) {
            return arr;
        }

        int uniqueCount = 1;
        for (int i = 1; i < arr.length; i++) {
            boolean isDuplicate = false;
            for (int j = 0; j < uniqueCount; j++) {
                if (arr[i] == arr[j]) {
                    isDuplicate = true;
                    break;
                }
            }
            if (!isDuplicate) {
                arr[uniqueCount] = arr[i];
                uniqueCount++;
            }
        }

        int[] result = new int[uniqueCount];
        System.arraycopy(arr, 0, result, 0, uniqueCount);
        return result;
    }
```

```java
    public static void main(String[] args) {
        int[] originalArray = {1, 2, 3, 4, 2, 3, 5, 6, 1};
        System.out.println("Original array: " +
java.util.Arrays.toString(originalArray));

        int[] uniqueArray = removeDuplicates(originalArray);
        System.out.println("Array with duplicates removed: " +
java.util.Arrays.toString(uniqueArray));
    }
}
```

QUESTION 6.
Write a program to print the following patterns.

(i)
```
1
1 0
1 0 1
1 0 1 0
1 0 1 0 1
```

(ii)
```
A
ABA
ABCBA
ABCDCBA
ABCDEDCBA
ABCDEFEDCBA
```

Answer:

Pattern 1 - Number Pattern

```java
public class Pattern1 {
    public static void main(String[] args) {
        int n = 5;
        for(int i = 1; i <= n; i++) {
            for(int j = 1; j <= i; j++) {
                if(j % 2 == 1)
                    System.out.print("1 ");
                else
                    System.out.print("0 ");
            }
            System.out.println();
        }
    }
}
```

Pattern 2 - Character Pattern

```java
public class Pattern2 {
    public static void main(String[] args) {
        String str = "ABCDEF";
        for(int i = 1; i <= 6; i++) {
            // Print first half
            for(int j = 0; j < i; j++) {
                System.out.print(str.charAt(j));
            }
```

```
            // Print second half in reverse
            for(int j = i-2; j >= 0; j--) {
                System.out.print(str.charAt(j));
            }

            System.out.print("A");
            System.out.println();
        }
    }
}
```

QUESTION 7.
Write the code to print following patterns.

(i)
```
1
2 6
3 7 10
4 8 11 13
5 9 12 14 15
```

(ii)
```
A A A A A
A A A B B
A A C C C
A D D D D
E E E E E
```

Answer:

Pattern 1

```
public class Pattern1 {
    public static void main(String[] args) {
        int n = 5; // Number of rows
        int num = 1; // Starting number

        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print(num + " ");
                num++;
            }
            System.out.println();
        }
    }
}
```

Pattern 2

```java
public class Pattern2 {
    public static void main(String[] args) {
        char ch = 'A'; // Starting character
        int n = 5; // Number of rows

        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= n - i + 1; j++) {
                System.out.print(ch + " ");
            }
            ch++;
            System.out.println();
        }
    }
}
```

QUESTION 8.

Write a Java program ask to the user to enter any five strings like names to sort them in alphabetical order, then display the sorted string in alphabetical order.

e.g. Input: Enter 5 Names/Words:

Nelam
Payal
Kanak
Asha
Darshita

Output: Now the List is :

Asha
Darshita
Kanak
Nelam
Payal

Answer:

```java
import java.util.Arrays;
import java.util.Scanner;

public class SortStrings {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String[] strings = new String[5];

        System.out.println("Enter 5 strings (names or words):");

        // Input strings from user
        for (int i = 0; i < 5; i++) {
            System.out.print("Enter string " + (i + 1) + ": ");
            strings[i] = scanner.nextLine();
        }

        // Sort the strings
        Arrays.sort(strings);

        // Display the sorted strings
        System.out.println("\nSorted strings in alphabetical order:");
        for (String s : strings) {
            System.out.println(s);
        }
        scanner.close();
    }
}
```