THE FIRST COMPARATIVE EXAMINATION 2023-24
Class X (ICSE)
COMPUTER APPLICATIONS

Time: Two hours   **Maximum marks: 100**

Instructions:

* Answers to this paper must be written on the answer script provided separately.
* All subsections of each question are to be answered in the correct order.
* All working including rough work should be done on the same sheet as the rest of the answer.
* 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 the paper is the time allowed for writing the answers.
* Please do not write anything on the question paper except your name and roll number.
* The intended marks for questions or parts of questions are given in brackets [ ].
* Attempt **all** questions from **Section A** and any **four** questions from **Section B**.

SECTION A [40 marks]
(Attempt **all** questions from this section.)

Question 1   [20]

Choose the correct answer and write the correct option.

(i)   A mechanism in Java in which data and methods are combined together as one unit is termed as:
      (a) Polymorphism   (b) Encapsulation
      (c) Inheritance   (d) Abstraction

(ii)   Character literals in Java are enclosed within a pair of:
      (a) Single quotes   (b) Square brackets
      (c) Double quotes   (d) Curly brackets

(iii)   Example of an operator that can be used to combine two or more relational expression forming complex decision making construct is:
      (a) <=   (b) &&
      (c) %   (d) ++

(iv)   Keyword that declares a variable as a constant is:
      (a) finally   (b) final
      (c) public   (d) constant

(v)   Scanner class belongs to which of the following package?
      (a) java.io   (b) java.net
      (c) java.util   (d) java.awt

(vi) What will be the output of the expression Math.ceil(5.6) + Math.pow(3, 2)?
    (a) 15   (b) 13.0
    (c) 14.0   (d) 15.0

(vii) What will be the value of x after executing the following statement if x = 15 and y = 20?
$x = (x < y)?(x - y) : x + y;$

    (a) 5   (b) −5
    (c) 25   (d) 35

(viii) Which of the following is the correct declaration of a float type of a variable?
    (a) float a = 34.6546;   (b) float a = '34.6546 f'
    (c) float 34.6546f = a;   (d) float a = 34.654f;

(ix) Which of the following loops will execute the body of the loop even when condition controlling the loop is initially false?
    (a) for   (b) while
    (c) do-while   (d) switch

(x) How many times will the following loop execute?
```
int num = 5000;
while(num > 1)
num = num / 5;
```
    (a) loop is executed 2 times   (b) loop is executed 3 times
    (c) loop is executed 5 times   (d) loop is not executed

(xi) Keyword which is used while creating an object:
    (a) new   (b) void
    (c) create   (d) break

(xii) A sequence of statements enclosed between a pair of curly brackets is called _____.
    (a) a null statement   (b) a compound statement
    (c) an empty statement   (d) a void statement

(xiii) Which of the following is a unary operator?
    (a) %   (b) >
    (c) ++   (d) /

(xiv) Data type of the value returned by Math.random() is?
    (a) int   (b) double
    (c) float   (d) byte

(xv) Single line comments can be added in the program by using _____.
    (a) //   (b) /*
    (c) \\   (d) /**

(xvi) Which one of the following statements has multidirectional flow of control?
- (a) switch - case
- (b) if
- (c) if-else
- (d) else-if

(xvii) The memory capacity(storage size) of float datatype in bytes is?
- (a) 4 bytes
- (c) 8 bytes
- (b) 2 bytes
- (d) 6 bytes

(xviii) The output of System.out.println("Plan"+ "\n" + "for \n the"+ "\t" + "Planet"); will be:

- (a) Plan for
  The
  Planet

- (b) Plan   for the Planet

- (c) Plan
  for
  the   Planet

- (d) Plan
  for
  　　the   Planet

(xix) Which of the following is the correct option to input a complete line of text from the console where sc is the object of Scanner class?
- (a) String s = sc.next( );
- (c) String s = sc.nextLine( );
- (b) String s = sc.nextline( );
- (d) string s = sc.nextLine( );

(xx) The statement used to stop the program immediately whenever required and terminate the Java Virtual Machine is:
- (a) System.in;
- (c) System.out;
- (b) System.exit(0);
- (d) break;

Question 2

(i) If $x = 9$ and $y = 5$, determine the value of x after executing the following statement:
$$x + = (++x) \% y + x;$$ [2]

(ii) Write Java expression for the following mathematical expression:
$$res = |(x + y)^n|$$ [2]

(iii) Rewrite the following using ternary operator:

```
if(p > q)
    m = p;
else if(q > p)
    m = q;
else
    m = 0;
```

(iv) What will be the output of the following program snippet? [2]

```
int sum = 0, x = 0;
while (x++ < 7)
    sum += x;
System.out.println(sum);
```

(v) Give the output of the following program part: [2]

```
char opn = 'c';
switch(opn)
{
    case 'e': System.out.println("Economic");
    break;
    case 'c' : System.out.println("Cultural");
    case 't' : System.out.println("Technological");
    break;
    default: System.out.println("Wrong Input");
}
System.out.println(opn);
```

(vi) Define Operator precedence. [2]

(vii) Re-write the following program snippet by using a do-while construct: [2]

```
for(char c = 'a'; c <= 'f'; c = (char)(c + 1))
System.out.println((int)c);
```

(viii) Differentiate between primitive datatype and reference datatype. [2]

(ix) Give output of the following part of the program code: [2]

```
double a = -56.53;
double b = 41.74;
double x = Math.abs(Math.ceil(++a));
double y = Math.round(Math.max(a, - -b));
System.out.println(x);
System.out.println(y);
```

(x) What are jump statements? Give an example. [2]

(Answer any four questions from this Section.)
The answer in this section should consist of the program in either BlueJ environment or any program environment with Java as the base.
Each program should be written using variables description / mnemonics code so that the logic of the program is clearly depicted. Flowcharts and algorithms are not required.

Question 3

A company for selling goods deals with two types of customers i.e. Dealers and Retailers. The company offers discount to the dealer and retailer at the time of purchasing goods for paying the bill, as per the tariff given below:

Days of payment	Discount for Dealer	Discount for Retailer
within 30 days	15%	10%
31 to 45 days	10%	5%
more than 45 days	No discount	No discount

Write a program in Java to accept the number of days within which the bill is paid, the type of customer 'D' for dealer and 'R' for retailer and the amount of purchase. Calculate and display the net amount to be paid by the customer at the time of paying the bill.   [15]

Question 4

A Dudeney number is a positive integer that is a perfect cube and also such that the sum of its digits is equal to the cube root of the number. Write a program in Java to input a number to check and print whether it is a Dudeney number or not.

Example:

Consider the number 512.

Sum of digits = 5 + 1 + 2 = 8

Cube root of 512 = 8   [15]

As Sum of digits = Cube root of Number hence 512 is a Dudeney number.

Question 5

Write a program in Java to print the sum of the following series:

$$S = -\frac{(p+q)^2}{2} + \frac{(p+q)^4}{4} - \frac{(p+q)^6}{6} \ .... + \frac{(p+q)^n}{n}$$ [15

The program should ask the user for required inputs.

Question 6

Write a program in Java to print the following pattern:

```
#1
#3   1
#5   3   1
#7   5   3   1
#9   7   5   3   1
```

[15]

Question 7

Design a menu driven program in Java using *switch-case* construct that computes the volume of a cube, a sphere or of a cuboid:

1. Volume of cube $= s \times s \times s$

2. Volume of sphere $= \dfrac{4}{3}\pi r^3$

3. Volume of cuboid $= l \times b \times h$

The program should ask for the necessary inputs from the user.

[15]

Question 8

Write a program in Java to input a number and check if it is an **ugly** number or not. Ugly numbers are numbers whose only prime factors are 2, 3 or 5. 14 is not Ugly since it includes another prime factor 7. 6 is Ugly since it includes only 2 and 3 as prime factors.

[15]