Experts' Institute
8-D, Kutchery Road Prayagraj. Ph:9415368884

JAVA
Comp. Applications

Python
Robotics & AI

ST. JOSEPH'S COLLEGE, PRAYAGRAJ
PRE-BOARD EXAMINATION 2024
COMPUTER APPLICATIONS

TIME: 2 Hours   CLASS – X   MM: 100

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

Q 1) Choose the correct answer and write the correct option.   **[20]**
(Do not copy the question, write the correct answers only)

1) In Java, the size of a special character (e.g., @, #, $, etc.) when stored in a char data type is:
   a) 1 byte   b) 2 bytes   c) 4 bytes   d) 8 bytes

2) What does the String.valueOf(int i) method do?
   a) Converts a string to an integer.   b) Converts an integer to a string.
   c) Checks if a string is a valid integer.   d) None of these

3) What does the below diagram illustrate about Bubble sort?

```
6 4 1 2 5    4 1 2 5 6    1 2 4 5 6    1 2 4 5 6

4 6 1 2 5    1 4 2 5 6    1 2 4 5 6    1 2 4 5 6

4 1 6 2 5    1 2 4 5 6    1 2 4 5 6

4 1 2 6 5    1 2 4 5 6

4 1 2 5 6
```

   a) Elements are compared and swapped based on their values, and the largest element "bubbles" to its correct position at the end of the array after each pass.
   b) The smallest element is placed in its correct position at the start of the array after each pass.
   c) Bubble Sort compares all elements in the array but does not perform any swapping.
   d) Bubble Sort sorts the array completely in a single pass

4) The method to compare two strings lexicographically (dictionary order) in Java is:
   a) equals()   b) compareTo()   c) substring()   d) charAt()

5) Given a string str="MachiNElearNingandAI";
   The output of str.substring(5,12) will return _____ characters.
   a) 6   b) 7   c) 8   d) None of these

6) What will be the output of the following code:

```java
int a[ ]= new int[5];
for(int i=0;i<5;i++)
    {
a[i]=i;
System.out.print(a[i]+ " ");
i++;
}
```

   a) 1 3 5   b) 0 2 4   c) 0 1 2   d) 2 3 4

7) Object in Java are ....
   a) classes   b) references   c) iterators   d) none of these

8) Assertion(A): Array index starts from 0. String index starts from 0.
   Reason(R): Arrays and Strings are the same data structures in Java.
   a) Both A and R are true and R is the correct explanation of A.
   b) Both A and R are true and R is not the correct explanation of A.
   c) A is true but R is false.
   d) A is false but R is true.
   e) Both A and R are false.

9) What is the output of Math.floor(5.8)?
   a) 5.0   b) 6.0   c) 6   d) 5

10) State the output of the following program segment:
```java
String s= "Examination";
int n=s.length();
```

```
System.out.println(s.startsWith(s.substring(5,n)));
System.out.println(s.charAt(2)= =s.charAt(6));
```
   a) false   b) true   c) false   d) true
      true   true   false   false

11) Which of the following is the wrapper class for the data type char?
   a) String   b) Char0   c) Character   d) Float

12) Which of the following does not return a String?
   a) toLowerCase()   b) concat()   c) indexOf()   d) replace()

13) What will be the output of the following program code:
```
int x[] = {4, 3, 7, 8, 9, 10};
int p = x.length;
int q = x[2] + x[5] * x[1];
System.out.println("p=" + p);
System.out.println("q=" + q);
```
   a) p=6   b) p=7   c) p=7   d) p=6
      q=36   q=36   q=37   q=36

14) Which of the following packages stores all the simple data types in Java?
   a) Lang   b) java   c) util   d) java.packages

15) Array elements are always stored in ………… memory locations.
   a) Sequential   b) Random   c) Sequential and Random   d) Classes

16) To restrict a variable of a class from inheriting to subclass, how variable should be declared?
   a) public   b) protected   c) private   d) none of these

17) Assertion(A): After every iteration in selection sort technique, the size of sorted subarray increases by one and the size of unsorted subarray decreases by one.
   Reason(R): In every iteration of the selection sort, the minimum element from the unsorted subarray is picked and moved to the beginning of unsorted subarray.
   a) Both A and R are true and R is the correct explanation of A.
   b) Both A and R are true and R is not the correct explanation of A.
   c) A is true but R is false.
   d) A is false but R is true.
   e) Both A and R are false.

18) Read the following text, and choose the correct answer:
   The byte code is a highly optimized set of instructions designed to be executed by the Java run time system.
   Choose a suitable term to describe the above statement
   a) Java runtime environment   b) Java development kit
   c) Java virtual machine   d) Integrated development environment

19) What happens if you try to access an array element at an index that is out of bounds in Java?
   a) It returns null.   b) It throws an ArrayIndexOutOfBoundsException.
   c) It returns 0.   d) It returns -1.

20) Which of the following is not a characteristic of a constructor in Java?
   a) A constructor must have the same name as the class.
   b) A constructor can have a return type.
   c) A constructor is automatically called when an object of a class is created.
   d) A constructor can be overloaded.

Q 2)

1) a) Write the Java expression for $\sqrt{A^2 + B^2 + C^2}$ [2]
   b) State the final value if int y=10, then find:
   int z=(y++ * (y++ +5));

2) Find errors in the given program code and re-write the statements correctly to assign values to an integer array.   [2]
```
int a = new int (5);
for (int i = 0; i <= 5; i++)
a[i] = i;
```

3) When do we declare a member of a class as static?   [2]

4) Analyze the given program segment and answer the following questions: [2]
   a) Write the output of the program segment.
   b) How many times does the body of the loop gets executed?
   ```
   for(int m = 5; m <= 20; m += 5)
   ```

[2]

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```
        {
            if (m % 3 == 0)
                break;
            else
            if (m % 5 == 0)
            System.out.println(m);
                continue;
        }
```

5) Differentiate between parse and valueOf( ). Give one example of each.   [2]
6) State the total size in bytes, of both the arrays a[4] of char data type and p[4] of float data type. [2]
7) State the values stored in string variables str1 & str2.   [2]

    String s1 = "good";
    String s2 = "world matters";
    String str1 = s2.substring(5).replace('t', 'n');
    String str2 = s1.concat(str1);

8) State two difference between binary search and linear search?   [2]
9) How are private members of a class different from public members?   [2]
10) Write the return data type of the following functions: [2]
    a) startsWith( )
    b) random( )

Section – B

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

*Each program should be written using **variable description** so that the logic of the program is clearly depicted. Flowcharts and algorithms are not required.*

Q 3) Create a class **factorial** with the following specifications: [15]

   Private data members: int num, f (integer variables)

   Public Member Methods:

factorial( )	a default constructor to assign 1 to 'f'.
factorial(int n)	a parametrized constructor to assign **num=n.**
Int getFactorial( )	to find and return the factorial of **num**
void display()	to check and print whether the number is a prime palindrome or not.

   Write a main() method to input a number and by invoking methods, print the factorial.

Q 4) Write a program to input the values of three coefficients of a quadratic equation $AX^2+BX+C=0$. Find the roots of the equation and display them, stating whether they are real, imaginary or equal.   [15]

Q 5) Write a menu driven program to perform the following operation as per user's choice.   [15]

    Choice 1:
       ABCDE
       ABCD
       ABC
       AB
       A
    Choice 2:
       BLUEJ
       LUEJB
       UEJBL
       EJBLU
       JBLUE

For an incorrect option, an appropriate error message should be displayed.

Q 6) Write a program to input 20 integers from the keyboard, assuming that no integer entered is zero. Perform selection sort on the integers and then print then in ascending order. Print the sorted array.   [15]

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Q 7) Define a class to input a 3×3 matrix and determine if it is a magic square (the sum of each row, column, and diagonal is the same). **[15]**

Sample Input:
Enter elements of 3X3:

```
2  9  4
7  5  3
6  1  8
```

Sample Output:
The matrix is a Magic square.

Q 8) Write a program to assign a full path and file name as given below. Using library functions, extract and output the file path, file name and file extension separately as shown. **[15]**

Sample Input:
C:\Users\admin\Pictures\flower.jpg

Sample Output:
Path: C:\Users\admin\Pictures\
File name: flower

Extension: jpg