COMPUTER APPLICATIONS

Maximum Marks: 100

Time allowed: Two hours

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[ ].*

Instruction for the Supervising Examiner

Kindly read aloud the Instructions given above to all the candidates present in the Examination Hall.

This paper consists of 12 printed pages.

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 only the correct answers.)

(i) The full form of ***JVM*** is:

(a) Java Visible Machine

(b) Java Virtual Mode

(c) Java Virtual Machine

(d) Java Visible Mode

(ii) Which of the following occupies ***2 bytes*** of storage?

(a) 25

(b) AM

(c) 35.2

(d) \\

(iii) In a statement ***c = c + (x * d + e);*** which ***variable*** is an ***accumulator***?

(a) *d*

(b) *c*

(c) *e*

(d) *x*

(iv) Which of the following is ***NOT*** an access specifier?

(a) private

(b) protected

(c) package

(d) public

(v) What is the output of the statement ***Math.pow (36, 6/5);*** ?

(a) 36.0

(b) 1.0

(c) 73.71

(d) 6.0

(vi) Read the *if program segment* given below:

```
if (a > b)
z = 25;
else
z = 35;
```

Which one of the following is the ***correct conversion*** of the ***if program segment*** to ***ternary***?

(a) z = a > b ? 35 : 25;

(b) z = a > b ? 25 : 35;

(c) z = a > b : 35 ? 25;

(d) z = a > b : 25 ? 35;

(vii) The output of the statement:

System.out.println***(Character.toUpperCase('b') + 2);*** is:

(a) 66

(b) 100

(c) 68

(d) 98

(viii) Consider the following statements:

```
Computer desktop = new Computer( );
Computer Mainframe = new Computer( );
```

Name the ***objects*** of the class given above:

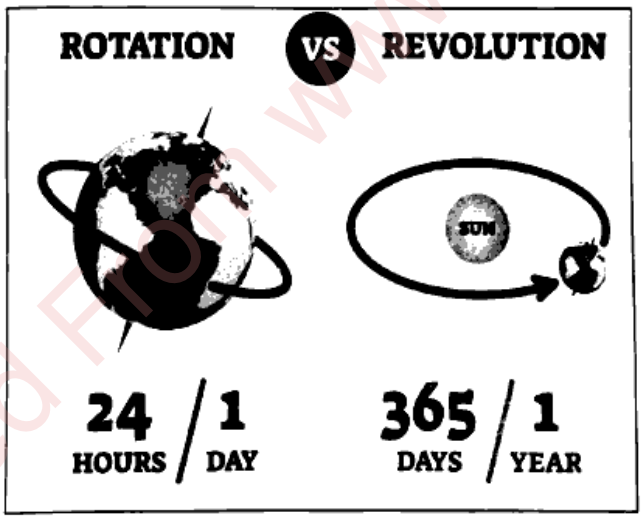
(a) Desktop, Mainframe

(b) desktop, Mainframe

(c) Computer, Mainframe

(d) Computer, desktop

(ix) The earth spins on its axis completing one rotation in a day. The earth revolves around the sun in 365 days to complete one revolution. What is the ***Java concept*** depicted in the given picture?



(a) Array

(b) Condition

(c) Nested loop

(d) While loop

(x) In the following method prototype to accept a character, an integer and return **YES** or **NO**, fill in the blank to complete the method prototype.

public _____ ***someMethod (char ch, int n)***

(a) boolean

(b) String

(c) int

(d) double

(xi) In a calculator which Java feature allows ***multiple methods named calculate()*** for the different operations?

(a) abstraction

(b) inheritance

(c) encapsulation

(d) polymorphism

(xii) **Assertion (A):** The result of the Java expression ***3 + 7/2*** is ***6***.

Reason (R): According to the hierarchy of operators in Java, addition is done first followed by division.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(xiii) What is the ***type of parameter*** to be given for the method ***parseInt( )?***

(a) double

(b) String

(c) char

(d) int

(xiv) To extract the word ***NOW*** from the word ***"ACKNOWLEDGEMENT"***, the Java statement ***"ACKNOWLEDGEMENT".substring(3, _____)*** is used.

Choose the correct number to fill in the blank.

(a) 6

(b) 7

(c) 5

(d) 8

(xv) String a[ ] = {"Atasi", "Aditi", "Anant", "Amit", "Ahana"};

System.out.println**(a[1].charAt(1) + "*" + a[2].charAt(2))**;

The ***output*** of the above statement is:

(a) da

(b) d * a

(c) ti

(d) t * i

(xvi) Which of the following ***String*** methods ***returns a negative value***?

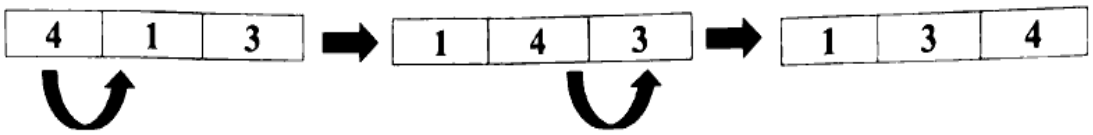
(a) length()

(b) equals()

(c) compareTo()

(d) charAt()

(xvii) An array with 3 elements is arranged in ascending order as follows:



Name the technique used:

(a) Bubble sort

(b) Linear Search

(c) Selection sort

(d) Binary Search

(xviii) The sales made by ***5*** salesmen selling ***5*** products is stored in a two-dimensional array of ***integer data type***. How many ***bytes*** does the array occupy?

(a) 25

(b) 200

(c) 50

(d) 100

(xix) **Assertion (A):** The substring() method modifies the original String.

Reason (R): The substring() method can extract part of a String starting from a specific index.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(xx) In ***constructor overloading*** all constructors should have the same name as of the class but with a different set of _____.

(a) Access specifiers

(b) Classes

(c) Return type

(d) Parameters

Question 2

(i) ***Rewrite*** the following program segment using a ***for loop***. [2]

```
int a = 5, b = 10;
while (b > 0)
{ b -= 2;
}
System.out.println (a * b);
```

(ii) ***Evaluate*** the Java expression: [2]

x = a * b % (++c) + (++a) + (--b);

if a = 7, b = 8, c = 2

(iii) Write the ***Java expression*** to find the ***sum of cube root of x and the absolute value of y***. [2]

(iv) Users must be above 10 years to open a self-operated bank account. Write this logic using a ***ternary operator*** and store the result (the eligibility message) in a String variable named idStatus and print it. [2]

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

```
String S = "GRACIOUS".substring(4);
System.out.println(S);
System.out.println ("GLAMOROUS".endsWith(S));
```

(vi) Give the ***output*** of the following program segment and mention ***how many times*** the loop is executed. [2]

```
int K = 1;
do
{ K + = 2;
System.out.println (K);
} while (K < = 6);
```

(vii) The following program segment ***calculates and displays the factorial of a number.*** [Example : Factorial of 5 is 1 x 2 x 3 x 4 x 5 = 120] [2]

```
int p, n = 5, f = 0;
for (p = n; p > 0; p – –)
f * = p;
System.out.println(f);
```

Name the type of error if any; correct the statement to get the desired output.

(viii) ***int X[ ][ ] = {{4, 5}, {7, 2}, {19, 4}, {7, 4}};*** [2]

Write the ***index of*** the ***maximum element*** and the ***index of*** the ***minimum element*** of the array.

(ix) The following program segment ***swaps the first element and the second element*** of the given array ***<u>without using the third variable</u>***, fill in the blanks with appropriate java statements: [2]

```
void swap()
{ int x[ ] = {4, 8, 19,24, 15};
(1) _____;
(2) _____;
x[0] = x[0] / x[1];
System.out.println(x[0]+" "+x[1]);   }
```

(x) Name the following: [2]

(a) The ***return data type*** of the method ***equals().***

(b) The ***String method*** which has ***no parameter*** and ***returns a String***.

SECTION B (60 Marks)

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

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 / mnemonic codes so that the logic of the program is clearly depicted.

Flowcharts and algorithms are not required.

Question 3 [15]

Define a class named ***StepTracker*** with the following specifications:

Member Variables:

String name — stores the user's name.

int sw — stores the total number of steps walked by the user.

double cb — stores the estimated calories burned by the user.

double km — stores the estimated distance walked in kilometers.

Member Methods:

void accept() — to input the name and the steps walked ***using Scanner class methods only***.

void calculate() — calculates calories burned and distance in km based on steps walked using the following estimation table:

Metric	Calculation Formula
Calories Burned	steps walked × 0.04 (e.g., 1 step burns 0.04 calories)
Distance (Km)	steps walked / 1300 (e.g., 1300 steps is approx. 1 km)

void display() — Display the calories burned, distance in km and the user's name.

Write a main method to ***create an object*** of the class and ***invoke the methods***.

Question 4 [15]

Write a program to accept the designations of 100 employees in a single dimensional array. Accept the designation from the user and ***print the total number of employees*** with the designation given by the user as input.

Example:

Trainee	Manager	Chef	Manager	Director	Manager

Input: Manager ***Output: 3***

Question 5 [15]

Write a program to accept a two-dimensional ***integer array of order 4 x 5*** as input from the user. Check if it is a ***Sparse Matrix*** or not. A matrix is considered to be a sparse, if the total number of zero elements is greater than the total number of non-zero elements. Print appropriate messages.

Example:

4	3	0	1	0
1	0	0	2	0
1	0	1	0	0
0	3	2	0	0

Number of zero elements = 11

Number of non zero elements = 9

Matrix is a Sparse Matrix

Question 6 [15]

Write a program to accept a number and check if it is a ***Mark number*** or not. A number is said to be Mark when sum of the squares of each digit is an even number as well as the last digit of the sum and the last digit of the number given is same.

Example: n = 246

sum = 2 x 2 + 4 x 4 + 6 x 6 = 56

56 is an even number as well as last digit is 6 for both sum as well as the number.

Question 7 [15]

Define a class to ***overload*** the method ***format*** as follows:

void format ():

To print the following pattern using ***Nested for loops only***:

1 2 3 4 5

2 3 4 5

3 4 5

4 5

5

int format (String s):

To calculate and return the sum of ASCII codes of each character of the String.

Example: CAB

Output: 67 + 65 + 66

198

void format (int n):

To calculate and display the sum of natural numbers up to ***n*** given by the formula.

$$\frac{n(n+1)}{2}$$

Question 8 [15]

Write a program to accept a word and print the ***Symbolic*** of the accepted word.

Symbolic word is formed by ***extracting*** the characters from the ***first consonant***, then add characters before the first consonant of the accepted word and end with "TR".

Example: **AIRWAYS** Symbolic word is **RWAYSAITR**

BEAUTY Symbolic word is BEAUTYTR