COMPUTER APPLICATIONS

(Theory)

(Two hours)

Answers 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.

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*

Question 1.

(a) Define **this** keyword. What is its significance? [2]

(b) State the Java concept that is implemented through:

(i) dividing a long set of instructions into smaller groups/modules

(ii) the wrapping up of data and its associated function into a class. [2]

(c) Differentiate between **parameterized** and **non-parameterized** constructor. [2]

(d) What are wrapper classes? Give an example. [2]

(e) Write statements to show how finding the length of a character array **ch[]** differs from finding the length of a String object **str**. [2]

Question 2.

(a) Name the Java keyword that:

(i) indicates that a method has no return type.

(ii) converts a variable into a constant. [2]

(b) What is polymorphism? How does function overloading implement polymorphism? [2]

(c) Explain: "**Objects encapsulate characteristics and behaviour**" [2]

(d) What is the difference between a **pure** and **mixed** expression. [2]

(e) Explain the use of the below given functions:

(i) trim()

(ii) isWhitespace() [2]

Question 3.

(a) Write correctly the following statement:

String S = ["A", "E", "I", "O", "U"]; [2]

(b) What is the need of type-casting? [2]

(c) Write a Java statement to:

(i) create an object **mp3** of class **Music**

(ii) import all the classes of the package named **simple** [2]

(d) What will the following functions return when executed:

(i) Math.max (-7, Math.min(-2, -9))

(ii) Math.ceil (32.17) [2]

(e) State the output of **System.out.println("Java".length() + "For School".length())**. [2]

Question 4.

(a) State the output of the following program segment: [2]

```
class Today  {
  static int a;
  char b;
  void input()       {
        a = 20;
        b = 'Z';
      }
  void convert()      {
        char c = (char)(a+b);
        System.out.println(c);
     }
public static void main()  {
        Today t = new Today();
        t.input();
        t.convert();
     }
}
```

(b) Based on the above given piece of code, answer the questions which follow:

(i) Name the instance, class and local variables.

(ii) What is the name of the constructor of the above class?

(iii) Explain the line: **Today t = new Today();** [3]

(c) Given a character array: **char arr[] = {'J', 'A', 'V', 'A'};** and an integer: **int b = 2;**
What will be the output of the below statements if they are executed one after the other:

(i) System.out.println(arr[b++]); (ii) System.out.println(arr[b]++); [2]

(d) Write a Java expression for: $X = \frac{-b+\sqrt{b^2-4ac}}{2a}$ [2]

(e) Write the prototype of a function which takes in 2 integer and 1 String arguments, and returns a value which is either 'true' or 'false' [1]

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 descriptions/Mnemonic Codes*** *such that the logic of the program is clearly depicted.*

Flow-Charts and Algorithms ***are not required.***

Question 5. [15]

Write a menu driven program in Java to input a number and check whether it is a:

(a) DISARIUM number or not

(b) DUCK number or not

Note:

DISARIUM: A number will be called DISARIUM if sum of its digits powered with their respective position is equal to the original number.
For example 135 is a DISARIUM
(Workings $1^1+3^2+5^2$ = 135, some other **DISARIUM** are 89, 175, 518 etc)

DUCK: A Duck number is a number which has zeroes present in it, but there should be no zero present in the beginning of the number.
For example 3210, 7056, 8430709 are all Duck numbers whereas 08237 is not.

Question 6. [15]

An airlines announces discount on tickets depending upon destination chosen by the passenger from the following:

Destination	**Rate of ticket (per person)**
America	Rs. 50000.0
Singapore	Rs. 20000.0
Japan	Rs. 40000.0
Thailand	Rs. 30000.0

The discount will be given as per the given criteria:

Ticket Amount	**Discount on Total amount**
Above Rs. 200000	25%
Rs. 150001 to Rs. 200000	20%
Rs. 100001 to Rs. 150000	15%
Less than Rs. 100000	10%

Write a Java program to input name of the passenger/group head (in case of more than 1 passengers), number of passengers and destination code viz: **A** or **a** for **America**, **S** or **s** for **Singapore**, **J** or **j** for **Japan**, and **T** or **t** for **Thailand**.

Calculate the total ticket amount and discount amount. Find the net balance to be paid excluding the discount. Print name, number of passengers, destination code, discount and total ticket amount to be paid.

Question 7. [15]

Write a Java program to input a sentence from the user in lowercase and capitalize the first and the last characters of every word in it.

Sample Input : i love java for school.
Sample Ouptut : I LovE JavA FoR SchooL

Some of the data members and member functions are given below:

Class name : Capitalize

Data members/instance variables:

sent	:	stores the sentence
cap	:	to store the new sentence
size	:	stores the length of the sentence

Member functions:

Capitalize()	:	default constructor
void readsentence()	:	to accept the sentence
void capfirstlast()	:	extract each word and capitalize the first and the last alphabet of the word and form a new sentence '**rev**' using the changed words
void display()	:	display the original sentence along with the new changed sentence.

Specify the class **Capitalize** giving details of the constructor **Capitalize ()**, **void readsentence()**, **void capfirstlast()** and **void display()**. Define the **main()** function to create an object and call the function accordingly to enable the task.

Question 8. [15]

Write a Java program to input a sentence. Count the number of times a particular word occurs in it. Display the frequency of the search word.

Sample Input	:	Enter a sentence	:	To be or not to be
		Enter a word to be searched	:	be
Sample Ouptut	:	Frequency of searched word	:	2

Question 9. [15]

Design a class to overload a function series() as follows:

(i) double series(double n) with one double argument and returns the sum of the series,

$$S = 1 + \frac{1}{2!} + \frac{1}{3!} + \cdots + \frac{1}{n!}$$

(ii) double series(double x, double n) with two double arguments and returns the sum of the series,

$$S = \frac{x}{1} + \frac{x^2}{4} + \frac{x^3}{9} + \cdots + \frac{x^n}{n^2}$$

Question 10. [15]

Write a program to input two integer arrays **A[]** and **B[]** of **m** and **n** sizes respectively. Create a third array **C[]** by merging the array **A[]** followed by the array **B[]**.

Sample Input : A[] = {6, 15, 7, 4, 9} and B[] = {3, 24, 6}
Sample Output : C[] = {6, 15, 7, 4, 9, 3, 24, 6}