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) What is meant by precedence of operators? [2]

(b) What is a literal? [2]

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

(i) a superclass and a subclass

(ii) the act of representing essential features without including background details. [2]

(d) Give a difference between a constructor and a method. [2]

(e) What are the types of casting shown by the following examples?

(i) double x = 15.2;

int y = (int)x;

(ii) int x = 12;

long y = x; [2]

Question 2

(a) Name any two wrapper classes. [2]

(b) What is the difference between a *break* statement and a *continue* statement when they occur in a loop? [2]

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

(d) Name the Java keyword that:

(i) indicates that a method has no return type

(ii) stores the address of the currently - calling object. [2]

(e) What is an exception? [2]

Question 3

(a) Write a Java statement to create an object *mp4* of class *digital.* [2]

(b) State the values stored in the variables *str1* and *str2*

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

[2]

(c) What does a class encapsulate? [2]

(d) Rewrite the following program segment using the if...else statement

```
comm =(sale>15000) ? sale×5/100 : 0;
```

[2]

(e) How many times will the following loop execute? What value will be returned?

```
int x=2,y=50;
do {
++x;
y-=x++;
} while(x<=10);
return y;
```

[2]

(f) What is the data type that the following library functions return?

(i) isWhitespace(char ch)

(ii) Math.random() [2]

(g) Write a Java expression for $ut+\frac{1}{2}ft^2$ [2]

(h) If int n[ ]={1,2,3,5,7,9,13,16}, what are the values of x and y?

```
x=Math.pow(n[4],n[2]);
y=Math.sqrt(n[5]+n[7]);
```

[2]

(i) What is the final value of *ctr* when the iteration process given below, executes?

```
int ctr=0;
  for(int i=1;i<=5;i++)
        for(int j=1;j<=5;j+=2)
              ++ctr;
```

[2]

(j) Name the methods of Scanner class that:

(i) is used to input an integer data from the standard input stream

(ii) is used to input a String data from the standard input stream. [2]

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** so that the logic of the program is clearly depicted.*

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

Question 4

Define a class named **FruitJuice** with the following description:

Instance variables/data members:

int product_code	-	stores the product code number
String flavour	-	stores the flavour of the juice (E.g. orange, apple, etc.)
String pack_type	-	stores the type of packaging (E.g. tetra-pack, PET bottle, etc.)
int pack_size	-	stores package size (E.g. 200 ml, 400 ml, etc.)
int product_price	-	stores the price of the product

Member methods:

(i) FruitJuice()	-	Default constructor to initialize integer data members to 0 and String data members to "".

(ii) void input() - To input and store the product code, flavour, pack type, pack size and product price.

(iii) void discount() - To reduce the product price by 10.

(iv) void display() - To display the product code, flavour, pack type, pack size and product price. [15]

Question 5

The International Standard Book Number (ISBN) is a unique numeric book identifier which is printed on every book. The ISBN is based upon a 10-digit code. The ISBN is legal if:

$1\times digit_1 + 2\times digit_2 + 3\times digit_3 + 4\times digit_4 + 5\times digit_5 + 6\times digit_6 + 7\times digit_7 + 8\times digit_8 + 9\times digit_9 + 10\times digit_{10}$ is divisible by 11.

Example: For an ISBN 1401601499

Sum=$1\times1 + 2\times4 + 3\times0 + 4\times1 + 5\times6 + 6\times0 + 7\times1 + 8\times4 + 9\times9 + 10\times9 = 253$ which is divisible by 11.

Write a program to:

(i) Input the ISBN code as a 10-digit integer.

(ii) If the ISBN is not a 10-digit integer, output the message, "Illegal ISBN" and terminate the program.

(iii) If the number is 10-digit, extract the digits of the number and compute the sum as explained above.

If the sum is divisible by 11, output the message, "Legal ISBN". If the sum is not divisible by 11, output the message, "Illegal ISBN". [15]

Question 6

Write a program that encodes a word into *Piglatin*. To translate word into a *Piglatin* word, convert the word into uppercase and then place the first vowel of the original word as the start of the new word along with the remaining alphabets. The alphabets present before the vowel being shifted towards the end followed by "AY".

Sample input (1) : London, Sample output (1) : ONDONLAY

Sample input (2) : Olympics, Sample output (2) : OLYMPICSAY [15]

Question 7

Write a program to input 10 integer elements in an array and sort them in descending order using the bubble sort technique. [15]

Question 8

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,

$$\text{sum} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \ldots + \frac{1}{n}$$

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

$$\text{sum} = \frac{1}{a^2} + \frac{4}{a^5} + \frac{7}{a^8} + \frac{10}{a^{11}} + \ldots\ldots\ldots\text{to n terms}$$ [15]

Question 9

Using the switch statement, write a menu driven program:

(i) To check and display whether a number input by the user is a composite number or not (A number is said to be a composite, if it has one or more than one factor excluding 1 and the number itself).

Example : 4, 6, 8, 9 ...

(ii) To find the smallest digit of an integer that is input.

Sample input : 6524

Sample output : Smallest digit is 2

For an incorrect choice, an appropriate error message should be displayed. [15]