

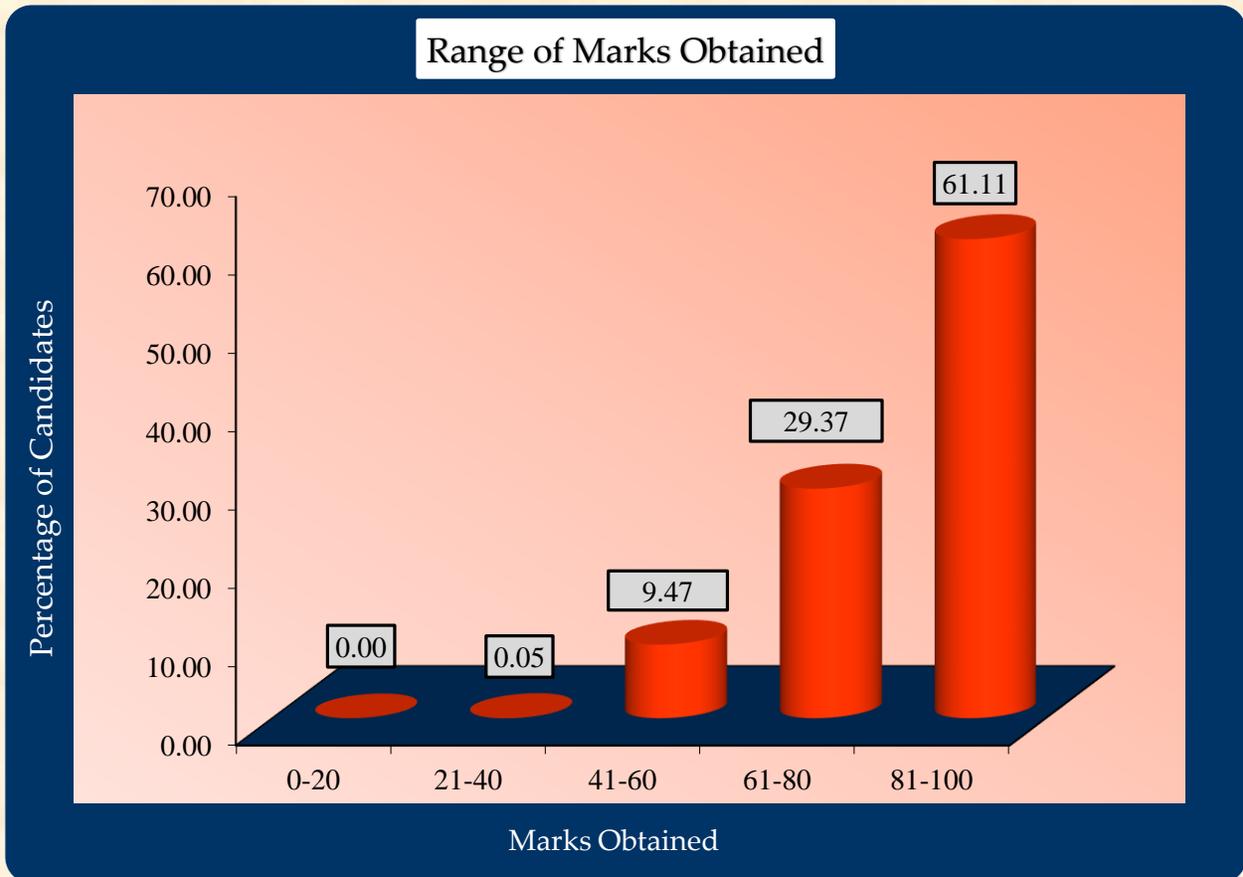
# COMPUTER APPLICATIONS

## STATISTICS AT A GLANCE

Total Number of students who took the examination	99,856
Highest Marks Obtained	100
Lowest Marks Obtained	27
Mean Marks Obtained	83.28

## Percentage of Candidates according to marks obtained

Details	Mark Range				
	0-20	21-40	41-60	61-80	81-100
<b>Number of Candidates</b>	0	45	9,459	29,331	61,021
<b>Percentage of Candidates</b>	0.00	0.05	9.47	29.37	61.11
<b>Cumulative Number</b>	0	45	9,504	38,835	99,856
<b>Cumulative Percentage</b>	0.00	0.05	9.52	38.89	100.00



# COMPUTER APPLICATIONS

## ANALYSIS OF PERFORMANCE

### Question 1.

- (a) Define Encapsulation. [2]
- (b) What are keywords? Give an example. [2]
- (c) Name any two library packages. [2]
- (d) Name the type of error ( syntax, runtime or logical error ) in each case given below: [2]
- (i) `Math.sqrt (36 – 45)`
- (ii) `int a;b;c;`
- (e) If `int x [ ] = { 4, 3 , 7, 8, 9, 10};` what are the values of **p** and **q**? [2]
- (i) `p = x.length`
- (ii) `q= x[2] + x[5] * x[1]`

### Comments of Examiners

#### 1.

- (a) A number of candidates answered correctly. However, some candidates confused Encapsulation with Data abstraction.
- (b) Examples of keywords were written in capital letters. For example, This, New, Public .... etc.
- (c) Majority of candidates wrote the full word instead of the name of the package. For example, utility was written instead of util.
- (d) Many candidates were confused between runtime and logical errors and therefore wrote incorrect answers.
- (e) The first part was answered correctly by most candidates. In the second part of the question some candidates were not clear about index position of the array and hence used wrong values for calculation of the answer.

### Suggestions for teachers

- ✓ Basic principles such as Encapsulation, Polymorphism etc. should be explained properly with examples.
- ✓ Explain the importance of case sensitivity while writing keywords.
- ✓ Difference between class and package must be explained with examples.
- ✓ Explain different types of errors with examples on the computer with clear cut differences.
- ✓ Calculation of length of an array and retrieving an element from a given array should be practiced.

<b>MARKING SCHEME</b>	
<b>Question 1.</b>	
(a)	<p>The wrapping up of data and functions (that operate on the data) into a single unit( called class) is known as encapsulation</p> <p style="text-align: center;">OR</p> <p>It is the way of combining both data and the functions that operate on that data under a single unit.</p> <p style="text-align: right;"><i>(Correct definition in any form)</i></p>
(b)	<p>Keywords are the words that convey a special meaning to the language Compiler. These are reserved for special purpose and must not be used as normal identifiers.</p> <p style="text-align: right;"><i>(Correct explanation with an example)</i></p>
(c)	<p>java.io.* or io package java.util.* or util package</p> <p style="text-align: right;"><i>(Any 2 library packages)</i></p>
(d)	<p>(i) Runtime error (ii) Syntax error</p>
(e)	<p>(i) 6 (ii) 37</p>

**Question 2.**

- (a) State the difference between `== operator` and `equals ( ) method` . [2]
- (b) What are the types of casting shown by the following examples: [2]
- (i) `char c = (char)120;`
- (ii) `int x = 't';`
- (c) Differentiate between *formal* parameter and *actual* parameter. [2]
- (d) Write a function prototype of the following : [2]
- A function **PosChar** which takes a string argument and a character argument and returns an integer value.
- (e) Name any two types of access specifiers. [2]

## Comments of Examiners

2.

- (a) Most candidates answered correctly. However, some candidates confused == operator with assignment operator.
- (b) Some candidates were unsure of the answer. They seem to have overlooked the mention of (char)120 in the question and therefore interchanged the answers.
- (c) A number of candidates were confused between formal parameters and actual parameters.
- (d) Many candidates were unable to write the function prototype. Some did not use the same variable name as mentioned in the question.
- (e) Most candidates answered correctly.

### Suggestions for teachers

- ✓ Give examples of the use of == operator and equals () method and practice exercise questions based on the above topics.
- ✓ Explain each type of conversion with proper examples and point out the difference between them.
- ✓ Explain the terms such as formal parameters and actual parameters and illustrate them with several examples
- ✓ Explain various parts of a function with different examples. Make it clear that the formal parameters require data types and variable names.
- ✓ Students should be reminded constantly about the importance of case sensitivity while writing keywords.

## **MARKING SCHEME**

### **Question 2.**

(a)	== is an operator which is used to check the equality between primitive data type equals () function checks the equality between Strings
(b)	(i) explicit type casting (ii) implicit type casting
(c)	Actual parameter : The parameter which is present in the function call statement is called actual parameter. It stores the original value. Formal parameter : The parameter which is present in function prototype or function signature is called formal parameter. It stores the duplicate value.
(d)	int PosChar( String s, char ch)
(e)	public /private/protected <span style="float: right;">(Any two)</span>

### Question 3.

- (a) Give the output of the following string functions : [2]  
(i) "MISSISSIPPI".indexOf('S')+ "MISSISSIPPI".lastIndexOf('T')  
(ii) "CABLE".compareTo("CADET")
- (b) Give the output of the following Math functions : [2]  
(i) Math.ceil(4.2)  
(ii) Math.abs(-4)
- (c) What is a parameterized constructor? [2]
- (d) Write down java expression for : [2]  
$$T = \sqrt{A^2 + B^2 + C^2}$$
- (e) Rewrite the following using ternary operator: [2]  
if (x%2 == 0)  
System.out.print("EVEN");  
else  
System.out.print("ODD");
- (f) Convert the following while loop to the corresponding for loop: [2]  
int m = 5, n = 10;  
while (n>=1)  
{  
    System.out.println(m\*n);  
    n-- ;  
}
- (g) Write one difference between primitive data types and composite data types [2]
- (h) Analyze the given program segment and answer the following questions: [2]  
(i) Write the output of the program segment  
(ii) How many times does the body of the loop gets executed?  
for (int m=5; m<=20; m+=5)  
{ if (m%3==0)  
    break;  
  else  
    if (m%5==0)  
      System.out.println(m);  
    continue;  
}
- (i) Give the output of the following expression : [2]  
a+= a++ + ++a + --a + a-- ;    when a = 7
- (j) Write the return type of the following library functions: [2]  
(i) isLetterOrDigit(char)  
(ii) replace(char, char)

## Comments of Examiners

3.

- (a) A few candidates answered both parts correctly. However, some candidates lacked the knowledge of String functions especially compare to () function.
- (b) In the first part of the question some candidates got confused regarding the output of the Math function ceil () However, majority of candidates answered the second part of the question correctly.
- (c) Many candidates had defined what is constructor instead of parametrized constructor.
- (d) Mathematical functions are so often used in Java but many candidates were unfamiliar with the syntax. Some of the errors made in this question were:  
T= math. sqrt(math.pow (A,2)+(B,2)+(C,2));  
T=Math.sqr(Math.pow(A+B+C),2);
- (e) A number of candidates were unfamiliar with the working of a ternary operator. Some of the errors made in this question are:  
If (x%2==0) ? EVEN: ODD;  
(x% 2= 0) ? “EVEN”: “ODD”;
- (f) Several candidates were confused with multiple initialization in the question and some forgot to update the control variable.
- (g) Majority of candidates were able to answer this question correctly. First part was well answered by most candidates where as in the second part some candidates got confused as to how many times body of the loop gets executed.
- (h)
- (i) A number of candidates did not add the initial value of the variable ‘a’ to the resulting value of the expression. They were not aware that in an expression of type a+= , the variable gets its initial value .
- (j) Many candidates answered the first part of the question correctly, whereas majority of candidates wrote char as the answer instead of String in the second part of the question.

## Suggestions for teachers

- ✓ String functions should be taught using examples. Practice questions on multiple String functions must be given in class regularly.
- ✓ Practice exercises on evaluation of the multiple and single mathematical functions must be given.
- ✓ Explain what is constructor, its need in the program. Then explain the basic difference between default and parametrized constructors.
- ✓ Math class, its functions and syntax must be taught in detail.
- ✓ Ternary operator, if...else statement with different examples and conversion from ternary operator to if...else and vice versa must be taught clearly.
- ✓ Sufficient examples of inter conversion between while loop and for loop and vice versa must be worked out on the board.
- ✓ Explain all technical terms, differences between them and ensure that students understand them thoroughly.
- ✓ Provide more practice questions on iterative processes where students have to predict the output especially using output statements.
- ✓ Order of evaluation of expression using arithmetic, assignment operators and increment and decrement operators must be clearly explained in class along with examples.
- ✓ Emphasize on the return type of all the string functions given in the syllabus.

<b>MARKING SCHEME</b>		
<b>Question 3.</b>		
(a)	(i) $2 + 10 = 12$ (ii) $- 2$	
(b)	(i) $5.0$ (ii) $4$	
(c)	Constructors that take arguments are called parameterized constructors	
(d)	$\text{Math.sqrt}(\text{Math.pow}(A,2)+ \text{Math.pow}( B,2)+ \text{Math.pow}(C,2))$ OR $\text{Math.sqrt}((A*A+B*B+C*C))$	
(e)	<code>System.out.println((x%2==0)?"EVEN":"ODD");</code>	
(f)	<pre>for ( int m = 5 , n = 10; n &gt; = 1; n-- ) {     System.out.println ( m * n ) ; }</pre>	
(g)	<b>Primitive data types</b>	<b>Composite data types</b>
	1. fundamental data types.	Constructed using primitive data types
	2. Size is fixed	Size depends on the member variables/instance Variables
	3. Primitive data type is passed by value	Composite data type is passed by reference.
(h)	$m = 5$ $10$ Loop is executed 3 times	
(i)	$a = 7 + 7 + 9 + 8 + 8 = 39$	
(j)	boolean and String	

## SECTION B (60 Marks)

Attempt *any four* questions from this Section.

[15]

### Question 4.

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

Instance variables /Data members :

String Bname - stores the name of the book

double price - stores the price of the book

Member methods :

- (i) BookFair() - Default constructor to initialize data members
- (ii) void Input() - To input and store the name and the price of the book.
- (iii) void calculate() - To calculate the price after discount. Discount is calculated based on the following criteria

#### Price

Less than or equal to ₹1000

More than ₹ 1000 and less than or equal to ₹ 3000

More than ₹ 3000

#### Discount

2% of price

10% of price

15% of price

- (iv) void display() - To display the name and price of the book after discount.

Write a main method to create an object of the class and call the above member methods.

### Comments of Examiners

4. Many candidates answered this question correctly. Some common errors found were:

- (i) Using a different class name than the one given in the question.
- (ii) constructor syntax was incorrect (return type void was used, variables were declared inside the constructor).
- (iii) A single function was used instead of the one asked for in the question.
- (iv) Price after discount was not calculated.
- (v) Use of  $\leq$  and  $\geq$  instead of the operators  $< =$  and  $> =$ , using commas in numbers
- (vi) Some candidates wrote input method with parameters but got confused with the local and global variables.
- (vii) Syntax for object creation and function call were incorrect.

### Suggestions for teachers

- ✓ Train students to use the same names for variables and methods as given in the question.
- ✓ Constructor syntax to be explained comprehensively with additional revision and practice on writing constructors.
- ✓ Programs on multiple functions of all types to be revised on a consistent basis.
- ✓ Guide and instruct students to convert English statements having conditions with ranges to JAVA if...else statements using proper relational operators.
- ✓ Advise students, in school exams against using  $\leq$  and  $\geq$  instead of  $< =$  and  $> =$ .
- ✓ Difference between global and local variables and how to use them in multiple function programs should be explained clearly in class.
- ✓ Creation of an object and invoking methods using the object need to be practiced thoroughly.

## MARKING SCHEME

### Question 4.

```
import java.util.*;
class BookFair {
    String Bname;
    double price;
    BookFair() {
        Bname="";
        price =0.0d; }
void input() {
    Scanner sc=new Scanner(System.in);
    System.out.println("Enter Name and Price " );
    Bname=sc.next();
    price=sc.nextDouble(); }
void calculate() {
    if(price<=1000)
        price= price-price*2/100;
    else if(price<=3000)
        price =price-price*10/100;
    else
        price =price-price*15/100; }
void display() {
    System.out.println("Name :" +Bname);
    System.out.println("Price :" +price); }
public static void main(String args[])
{
    BookFair obj=new BookFair();
    obj.input();
    obj.calculate();
    obj.display();
}}
```

Variable description/Mnemonic codes

### Question 5.

Using the switch statement , write a menu driven program for the following:

[15]

(i) To print the Floyd's triangle [Given below]

```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

(ii) To display the following pattern

```
I
I C
I C S
I C S E
```

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

#### Comments of Examiners

5. Common errors made by candidates while attempting this question were:

- (i) Menu not displayed or choice not input.
- (ii) Wrote two separate programs instead of one.
- (iii) Syntax of switch and default statements were wrong.
- (iv) Forgot to write break statement.
- (v) Using println() in place of print() and vice versa.
- (vi) The patterns were obtained with multiple print statements row after row.

Other mistakes observed were:

- (i) Candidates printed the loop variable instead of using a counter and using it for printing the output.
- (ii) Candidates did not know how to extract a letter from a string.

#### Suggestions for teachers

- ✓ Menu driven programs using switch ...case should be practiced in class.
- ✓ The significance of break and default statements should be explained.
- ✓ Adequate examples and exercise questions based on loop concept and nested loop must be given in class.
- ✓ Method of extracting character should be explained to candidates.

## MARKING SCHEME

### Question 5.

```
import java .util.*;
class ques5 {
public static void main(String args[] ) {
    Scanner obj = new Scanner (System.in);
    int choice,x; System.out.println("Enter 1 pattern1 , 2 Pattern2");
    choice =obj.nextInt();
    switch(choice) {
    case 1: int r, c, k = 1;
    for (r = 1; r <= 5 ; r ++ )      {
    for (c=1;c<=r;c++)      {
    System.out.print(" "+k);
    k++;      }
    System.out.println();      }
        break;
    case 2:
    String s="İCSE";
    for(int i=0;i<s.length();i++ ) {
        System.out.println(s.substring(0,i+1)); }
        break;
    default : System.out.println("Sorry wrong choice");
        }
        }
    }
    Variable description/Mnemonic codes
```

**Question 6.**

Special words are those words which starts and ends with the same letter.

[15]

Examples:

EXISTENCE

COMIC

WINDOW

Palindrome words are those words which read the same from left to right and vice-versa

Examples:

MALAYALAM

MADAM

LEVEL

ROTATOR

CIVIC

All *palindromes* are *special words*, but all *special words* are not *palindromes*.

Write a program to accept a word check and print whether the word is a *palindrome* or only *special word*.

Comments of Examiners

6. Most candidates assigned a value given in the example instead of accepting it from the user. Other mistakes were:
- (i) Initial and final values of the loop were wrong.
  - (ii) Instead of applying proper logic to reverse a word the library function reverse ().
  - (iii) Extraction of the first and the last character of the string was incorrect.
  - (iv) Candidates wrote the program for a palindrome number.

Suggestions for teachers

- ✓ Advise students to read the question carefully.
- ✓ Index value of the string starts from zero is an important point that must be explained with examples.
- ✓ All commonly used functions must be taught using examples.
- ✓ The difference between String reverse and number reverse must be taught.

## MARKING SCHEME

### Question 6.

```
import java .util.*;
class ques6
{
public static void main (String s[])//throws IOException
    {
        Scanner obj = new Scanner(System.in);
        System.out.println(" enter a word ");
        String word = obj.nextLine();
        String rword="";
        int l,x;
        l= word.length();
        for(x=l-1;x>=0;x--)
            rword = rword+ word.charAt(x);
        if(word.equals(rword))
            System.out.println( word +" is palindrome");
        else
            if(word.charAt(0) == word.charAt(l-1))
                System.out.println( word +"is a special word");
        }
    }
```

Variable description/Mnemonic codes

### Question 7.

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

[15]

- (i) void SumSeries(int n, double x) – with one integer argument and one double argument to find and display the sum of the series given below :

$$s = \frac{x}{1} - \frac{x}{2} + \frac{x}{3} - \frac{x}{4} + \frac{x}{5} \dots \dots \dots \text{ to } n \text{ terms}$$

- (ii) void SumSeries() – To find and display the sum of the following series :

$$s = 1 + (1 \times 2) + (1 \times 2 \times 3) + \dots \dots \dots + (1 \times 2 \times 3 \times 4 \dots \dots \dots \times 20)$$

## Comments of Examiners

7. Most candidates answered this question correctly, however a few common mistakes were observed:
- Function overloading concept was not followed instead, two separate programs were written.
  - Use double instead of void as return type of the function.
  - Candidates accepted the values from the user with in the function instead of accepting them as parameters.
  - Declaration and initialization of variable 's' which is used to accumulate the value of the series was not done properly.
  - In the first part of the question, extraction and accumulation of negative and positive terms was not done properly. In the second part of the question finding the factorial and accumulation of it was also not done properly.

### Suggestions for teachers

- ✓ Function overloading concept should be taught clearly.
- ✓ Use of double data type and its initialization must be taught
- ✓ Program on function overloading covering all logics must be done in class.

## **MARKING SCHEME**

### **Question 7.**

```
import java.util.*;
class Q7 {
    void SumSeries(int n, double x) {
        double sum=0.0d;
        int i;
        for(i=1;i<=n;i++)
        { if (i%2==0 )
            sum=sum-x/(double)i;
          else
            sum=sum+x/(double)i;        }
        System.out.println("sum="+sum); }
    void SumSeries() {
        int s=0, p=1;
        for(int i=1;i<=20;i++) {
            p=p*i;
            s=s+p; }
        System.out.println("sum="+s); }
    public static void main(String args[]) {
        Q7 obj=new Q7();
        obj.SumSeries(5,2.0);
        obj.SumSeries();
    }
}
```

### Question 8.

Write a program to accept a number and check and display whether it is a **Niven** number or not. (Niven number is that number which is divisible by its sum of digits). [15]

Example :

Consider the number 126.

Sum of its digits is  $1+2+6 = 9$  and 126 is divisible by 9.

### Comments of Examiners

8. Most of the candidates answered this question correctly. However, few common mistakes were observed:
- Duplicate value of the accepted number was not done by most of the candidates.
  - Extraction of digits was not done in a proper way.
  - Loop control variable was not updated ( $num = num/10$ )
  - Variable sum to add all digits of the number was not initialized.
  - Candidates checked whether the sum is divisible by num, instead of checking whether num is divisible by sum.

### Suggestions for teachers

- ✓ Instruct students to read the question carefully.
- ✓ The program should be done carefully and importance of having a duplicate copy of a number should be explained to the students.
- ✓ Guide students to extract digits from numbers with examples.
- ✓ Difference between / and % should be explained clearly.

### MARKING SCHEME

#### Question 8.

```
import java.util.*;

class Niven
{ public static void main(String args[]) {
    Scanner sc =new Scanner(System.in);
    System.out.println("enter number");
    int num=sc.nextInt( );
    int n=num;
    int rem;
    int sum=0;
    while(num>0)
    { rem=num%10;
      sum=sum+rem;
      num=num/10;    }
    if(n%sum==0)
    System.out.println("Niven number");
    else
    System.out.println("not Niven Number");
} }
```

### Question 9.

Write a program to initialize the seven Wonders of the World along with their locations in two different arrays. Search for a name of the country input by the user. If found, display the name of the country along with its Wonder, otherwise display “Sorry Not Found!”. [15]

Seven wonders - CHICHEN ITZA, CHRIST THE REDEEMER, TAJMAHAL, GREAT WALL OF CHINA, MACHU PICCHU, PETRA, COLOSSEUM

Locations - MEXICO, BRAZIL, INDIA, CHINA, PERU, JORDAN, ITALY

Example - Country Name : INDIA      Output : INDIA - TAJMAHAL

Country Name : USA      Output : Sorry Not Found!

#### Comments of Examiners

9. Common errors found were:

- (i) Syntax error in declaring and initializing of arrays.
- (ii) Double quotes were not used for any string values.
- (iii) Country name to be searched was not accepted from the user.
- (iv) Incorrect limits of loop  
For (int i=1; i<=7;i++)
- (v) outputting of messages were incorrectly placed.

#### Suggestions for teachers

- ✓ Solve number of problems on arrays having various data types.
- ✓ Syntax for creation of an array as well assigning values and accepting input values in an array need to be practiced with different examples.

#### **MARKING SCHEME**

##### **Question 9.**

```
import java.util.*;
class wonders {
    public static void main(String args[]) {
        String w[]={ "CHICHEN ITZA","CHRIST THE REDEEMER", "TAJMAHAL",
"GREATWALL
                OF CHINA","MACHU PICCHU","PETRA","COLOSSEUM"};
        String l[]={ "MEXICO","BRAZIL","INDIA","CHINA","PERU","JORDAN","ITALY"};
        String s;int i,len;
Scanner br=new Scanner(System.in);
System.out.println("Enter the name" );
s=br.nextLine();
```

```
len=s.length();
boolean flag=false;
for (i=0;i<len;i++)      {
if(s.equalsIgnoreCase(l[i])) {
System.out.println(l[i]+" "+ w[i]);
flag =true;
break;  }}
if(flag== false)
System.out.println("Sorry Not Found");      }}
```

### **Topics /Concepts found difficult**

- Conversion of if() to ternary operator
- Parametrized constructor
- Typecasting
- Finding, how many number of times body of the loop gets executed
- Types of errors
- Nested loop
- String functions
- Series Programs
- Function overloading

### **Suggestions for Students: -**

- Attempt all questions in Section A
- Read the question carefully before answering.
- Practice programs on the Computer.
- A good variable description containing a list of important variables used in the program along with their data types and purpose must be given at the end of every program.
- Project work should be done independently to reinforce all concepts
- Do not write meaningless words like SOP, SOPLN, PSVM etc. for System.out.print, System.out.println, public static void main