Lab No.	Practical Description
1	**Demonstrate of Basics of C programming**

1) Write a program to find whether a number is Positive or Negative. (A)

```
#include <stdio.h>

void main() {
   int n;
   printf("Enter Number\n");
   scanf("%d", &n);

   if(n > 0) {
      printf("Positive\n");
   } else if(n < 0) {
      printf("Negative\n");
   } else {
      printf("Zero\n");
   }

}
```

2) Write a program to find maximum number from given three numbers. (A)

```
#include <stdio.h>
void main() {
   int n1, n2, n3;
   printf("Enter 3 Numbers\n");
   scanf("%d %d %d", &n1, &n2, &n3);
   if(n1 > n2 && n1 > n3) {
      printf("Largest Number is: %d\n", n1);
   } else if(n2 > n1 && n2 > n3) {
      printf("Largest Number is: %d\n", n2);
   } else {
      printf("Largest Number is: %d\n", n3);
   }
}
```

3) Write a program to Print day name of week using switch. (A)

```
#include <stdio.h>
void main() {
   int choice;
   printf("Enter number of Day:\n");
   scanf("%d", &choice);

   switch(choice) {
      case 1: printf("Monday\n"); break;
      case 2: printf("Tuesday\n"); break;
      case 3: printf("Wednesday\n"); break;
      case 4: printf("Thursday\n"); break;
```

```
            case 5: printf("Friday\n"); break;
            case 6: printf("Saturday\n"); break;
            case 7: printf("Sunday\n"); break;
            default: printf("Invalid Input\n"); break;
        }

    }
```

4) Write a program to print 1 to N number using for, while and do…while loop. (A)

```
#include <stdio.h>
void main() {
    int n, i;
    printf("Enter a Number to Print\n");
    scanf("%d", &n);

    printf("Using For Loop\n");
    for(i = 1; i <= n; i++) {
        printf("%d ", i);
    }
    printf("\nUsing While Loop\n");
    i = 1;
    while(i <= n) {
        printf("%d ", i);
        i++;
    }
    printf("\nUsing Do While Loop\n");
    i = 1;
    do {
        printf("%d ", i);
        i++;
    } while(i <= n);

    printf("\n");
    return 0;
}
```

5) Write a program to check the given number is Prime or not. (B)

```
#include <stdio.h>
void main() {
    int n, count = 0;
    printf("Enter a Number to check if it is Prime or Not\n");
    scanf("%d", &n);

    for(int i = 1; i <= n; i++) {
        if(n % i == 0) {
            count++;
        }
    }
```

```
    if(count == 2) {
       printf("%d is a Prime Number\n", n);
    } else {
       printf("%d is Not a Prime Number\n", n);
    }

    return 0;
}
```

6) Write a program to Check whether the given number is Palindrome or not. (C)

```
#include <stdio.h>
void main() {
   int n, temp, rev = 0, rem;
   printf("Enter a Number to check if it is Palindrome or Not\n");
   scanf("%d", &n);
   temp = n;

   while(temp > 0) {
      rem = temp % 10;
      rev = rev * 10 + rem;
      temp /= 10;
   }
   if(rev == n) {
      printf("%d is a Palindrome Number\n", n);
   } else {
      printf("%d is Not a Palindrome Number\n", n);
   }
}
```

7) Write a program to Check whether the given number is Armstrong or not. (C)

```
#include <stdio.h>
void main() {
   int n, temp, rem, sum = 0;
   printf("Enter a Number to check if it is Armstrong or Not\n");
   scanf("%d", &n);
   temp = n;

   while(temp > 0) {
      rem = temp % 10;
      sum += rem * rem * rem;
      temp /= 10;
   }

   if(sum == n) {
      printf("%d is Armstrong Number\n", n);
   } else {
      printf("%d is Not Armstrong Number\n", n);
```

```
    }

    return 0;
}
```

2 **Array & String in C programming**

1) Write a program to read N numbers from user and print in normal and reverse order. (A)

```
#include <stdio.h>

void main() {
    int n;
    printf("Enter the number of elements in the array:\n");
    scanf("%d", &n);
    int arr[n];
    printf("Enter the elements of the array:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }
    printf("The elements of the array are:\n");
    for (int i = 0; i < n; i++) {
        printf("%d", arr[i]);
    }
    printf("\n");
    printf("The elements of the array in reverse order are:\n");
    for (int i = n - 1; i >= 0; i--) {
        printf("%d", arr[i]);
    }
    printf("\n");
}
```

2) Write a program to calculate Sum and Average of given N numbers using Array. (A)

```
#include <stdio.h>

void main() {
    int n;
    printf("Enter the number of elements in the array:\n");
    scanf("%d", &n);
    int arr[n];
    int sum = 0;
    printf("Enter the elements of the array:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
        sum += arr[i];
    }
```

```
    printf("The elements of the array are:\n");
    for (int i = 0; i < n; i++) {
        printf("%d", arr[i]);
    }
    printf("\nSum of the elements of the array is: %d\n", sum);
    printf("Average of the elements of the array is: %d\n", sum / n);

}
```

3) Write a program to perform multiplication of two matrixes. (A)

```
#include <stdio.h>

int main() {
    int a[3][3], b[3][3], c[3][3];
    printf("Enter the elements of the first matrix:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            scanf("%d", &a[i][j]);
        }
    }
    printf("Enter the elements of the second matrix:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            scanf("%d", &b[i][j]);
        }
    }
    printf("Multiplication of the two matrices is:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            c[i][j] = 0;
            for (int k = 0; k < 3; k++) {
                c[i][j] += a[i][k] * b[k][j];
            }
        }
    }
    printf("Resultant matrix is:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            printf("%d ", c[i][j]);
        }
        printf("\n");
    }
    return 0;
}
```

4) Write a program to find length of given string without using built-in function. (A)

```
#include <stdio.h>
```

```
#include <string.h>

void main() {
   char str[100];
   int count = 0;
   printf("Enter a string: ");
   scanf("%s", str);
   for(int i = 0; str[i] != '\0'; i++) {
      count++;
   }
   printf("The length of string is: %s\n", count);
}
```

5) Write a program to Find Max and Min of given N numbers from an array. (B)

```
#include <stdio.h>

void main() {
   int n;
   printf("Enter Size of array:\n");
   scanf("%d", &n);
   int arr[n];
   printf("Enter the elements of the array:\n");
   for (int i = 0; i < n; i++) {
      scanf("%d", &arr[i]);
   }
   int min = arr[0];
   int max = arr[0];
   for (int i = 0; i < n; i++) {
      if (arr[i] < min) {
         min = arr[i];
      }
      if (arr[i] > max) {
         max = arr[i];
      }
   }
   printf("The minimum element of the array is: %d\n", min);
   printf("The maximum element of the array is: %d\n", max);
}
```

6) Write a program to Copy given string into another string without using built-in function. (C)

```
#include <stdio.h>
#include <string.h>

void main() {
   char input[100];
```

```
        printf("Enter a string:\n");
        scanf("%s", input);
        char copy[100];
        for(int i = 0; input[i] != '\0'; i++) {
            copy[i] = input[i];
        }
        printf("The copied string is: %s\n", copy);

    }
```

3 **Demonstrate of Basics of Java programming**

1) Introduction to JDK (Java Development Kit) and path setting. (A)
2) Write a program to print “Welcome to Java”. (A)

```
public class Pr1 {
    public static void main(String[] args) {
        System.out.println("Welcome to Java");
    }
}
```

3) Write a program to print your address i) using single print ii) using multiple println. (A)

```
public class Pr2 {
    public static void main(String[] args) {
        //using Single Print
        System.out.print("'House name'");
        System.out.print(" 'Street name'");
        System.out.print(" 'City name'");
        //using Multiple Print
        System.out.println();
        System.out.println("'House name'");
        System.out.println("'Street name'");
        System.out.println("'City name'");

    }
}
```

4) Write a program to calculate Area of Circle. (area = pie*r*r) (B)

```
public class Pr3 {
    public static void main(String[] args) {
        double radius = 20;
        double area = Math.PI * radius * radius;
        System.out.println("Area of Circle is: " + area);
    }
```

```
}
```

5) Write a program to calculate simple interest ((principal*roi*time period)/100). (C)

```
public class Pr4 {
    public static void main(String[] args) {
        double p=10000, r=5, t=2;
        double si = (p * r * t) / 100;
        System.out.println("Simple Interest is: " + si);

    }
}
```

4 **Implementation of Scanner class and other Basic Java program**

1) Write a program to print addition of 2 numbers (with Scanner). (A)

```
import java.util.Scanner;
public class Pr1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int a= sc.nextInt();
        int b= sc.nextInt();
        int ans = a+b;
        System.out.println("Addition is: " + ans);
    }
}
```

2) Write a program to convert temperature from Fahrenheit to Celsius. (°C = [(°F - 32) * 5] / 9). (A)

```
import java.util.Scanner;

class Pr2 {
    public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter temperature in fahrenheit: ");
    double fahrenheit = sc.nextDouble();
    double celsius = (fahrenheit - 32) * 5 / 9;
    System.out.println("Temperature in celsius is: " + celsius);

    }
}
```

3) Write a program that reads a number in meters, converts it to feet, and displays the result. (Feet = Meters * 3.28084)(A)

```
import java.util.Scanner;

public class Pr3 {
    public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter Hight in meters:");
        double h = sc.nextDouble();
        double feet = h * 3.28084;
        System.out.println("Height in feet is: " + feet);
    }
}
```

4) Body Mass Index (BMI) is a measure of health on weight. It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters.
Write a program that prompts the user to enter a weight in pounds and height in inches and displays the BMI. (Note: - 1 pound=.45359237 Kg and 1 inch=.0254 meters) (B)

```
import java.util.Scanner;

public class Pr4 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter your weight in pounds: ");
        double weight = input.nextDouble();

        System.out.print("Enter your height in inches: ");
        double height = input.nextDouble();

        double weightKg = weight * 0.45359237;
        double heightMeters = height * 0.0254;

        double bmi = weightKg / (heightMeters * heightMeters);

        System.out.println("Your BMI is: "+bmi);
    }
}
```

5 **Implementation of Operators and Type Casting**

1) Write a program to check if given number is Positive or Negative using the ternary operator. (A)

```
import java.util.Scanner;

class Pr1 {
    public static void main(String[] args) {
        System.out.println("Enter a number:");
        Scanner scanner = new Scanner(System.in);
        int num = scanner.nextInt();
        String result = (num > 0)? "Positive" : (num < 0) ? "Negative" : "Zero";
        System.out.println(result);
    }
}
```

	2) Write a program in to find maximum number from given three numbers using conditional

operator. (A)

```
import java.util.Scanner;

public class Pr2 {
   public static void main(String[] args) {
      Scanner input = new Scanner(System.in);
      System.out.print("Enter 3 numbers: ");
      double num1 = input.nextDouble();
      double num2 = input.nextDouble();
      double num3 = input.nextDouble();
      double max = (num1 >= num2) ? ((num1 >= num3) ? num1 : num3) : ((num2 >= num3) ?
num2 : num3);
      System.out.println("The maximum is: " + max);
   }
}
```

3) Write a program to demonstrates Widening and Narrowing type casting. (A)

```
import java.util.Scanner;

public class Pr3 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);

      System.out.print("Enter a number (like 5.75): ");
      double num = sc.nextDouble();
      // int to double
      int small = 7;
      double big = small;
      System.out.println("int " + small + " to double: " + big);

      //  double to int
      int narrowsmall = (int) num;
      System.out.println("double " + num + " to int: " + narrowsmall);
   }
}
```

4) Write a program to demonstrate the usage of bitwise operator. (A)

```
import java.util.Scanner;

public class Pr4 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);

      System.out.print("Enter first number: ");
```

```
        int num1 = sc.nextInt();

        System.out.print("Enter second number: ");
        int num2 = sc.nextInt();

        System.out.println("Bitwise AND: " + (num1 & num2));
        System.out.println("Bitwise OR: " + (num1 | num2));
        System.out.println("Bitwise XOR: " + (num1 ^ num2));
        System.out.println("Bitwise NOT (first number): " + (~num1));
        System.out.println("Left Shift (first number by 1): " + (num1 << 1));
        System.out.println("Right Shift (first number by 1): " + (num1 >> 1));
    }
}
```

5) Write a program to check if given number is Odd or Even using the ternary operator. (B)

```
import java.util.Scanner;

public class Pr5 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a number:");
        int num = sc.nextInt();
        String result = (num % 2 == 0) ? "Even" :  "Odd";
        System.out.println(result);
    }
}
```

6 Implementation of Control Structure – Selection statement

1) Write a program to check whether a letter is a vowel or consonants. (A)

```
import java.util.Scanner;

class Pr1 {
  public static void main(String[] args) {
    System.out.println("Enter a character:");
    Scanner sc = new Scanner(System.in);
    char ch = sc.next().charAt(0);
    if(ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u' ||
       ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' || ch == 'U') {
      System.out.println(ch + " is a vowel.");
    } else {
      System.out.println(ch + " is a consonant.");
    }
  }
}
```

2) Write a program to determine grade based on marks. Read marks of five subjects. Calculate percentage and print class accordingly. Fail below 35, Pass Class between 35 to 45, Second Class between 45 to 60, First Class between 60 to 70, Distinction if more than 70. (A)

```
import java.util.Scanner;
public class Pr2 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter 5 subject marks:");
      int[] marks = new int[5];
      for (int i = 0; i < 5; i++) {
         marks[i] = sc.nextInt();
      }
      int total = 0;
      for (int i = 0; i < 5; i++) {
         total += marks[i];
      }
      double average = total / 5.0;
      if (average > 35) {
         System.out.println("Fail");
      } else if (average >= 35 && average <= 45) {
         System.out.println("Pass Class");
      } else if (average >= 45 && average <= 60) {
         System.out.println("Second class");
      } else if (average >= 60 && average <= 70) {
         System.out.println("First class");
      } else if (average > 70) {
         System.out.println("Distinction");
      }
   }
}
```

3) Write a program to make a Simple Calculator using switch...case. (A)

```
import java.util.Scanner;

class Pr3 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter your choice:(from +,-,*,/,%)");
      char choice = sc.next().charAt(0);
      System.out.println("Enter two numbers:");
      int a = sc.nextInt();
      int b = sc.nextInt();
      switch (choice) {
         case '+':
            System.out.println("Addition is: " + (a + b));
            break;
         case '-':
```

```
                System.out.println("Subtraction is: " + (a - b));
                break;
            case '*':
                System.out.println("Multiplication is: " + (a * b));
                break;
            case '/':
                System.out.println("Division is: " + (a / b));
                break;
            case '%':
                System.out.println("Remainder is: " + (a % b));
                break;
            default:
                System.out.println("Invalid choice.");
        }
    }
}
```

4) Write a program to find out largest number from given three numbers using nested if and if-else-if ladder. (B)

```
import java.util.Scanner;
 class Pr4 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter 3 numbers:");
        int a = sc.nextInt();
        int b = sc.nextInt();
        int c = sc.nextInt();
        if(a > b && a > c) {
            System.out.println("Largest number is: " + a);
        } else if(b > a && b > c) {
            System.out.println("Largest number is: " + b);
        } else {
            System.out.println("Largest number is: " + c);
        }
    }


}
```

5) Write a program to check whether a year is a leap year. (C)

```
import java.util.Scanner;
class Pr5 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter Year:");
        int year = sc.nextInt();
        if ((year % 4 == 0 && year % 100 != 0) || year % 400 == 0) {
            System.out.println(year + " is a leap year.");
```

```
        } else {
            System.out.println(year + " is not a leap year.");
        }
    }
}
```

7 **Implementation of Control Structure – Looping statement**

1) Write a program to print numbers from 1 to 10 using a for, while and do…while loop. (A)

```
class Pr1{
    public static void main(String[] args) {
        //Using For Loop
        System.out.println("Using For Loop");
        for (int i = 1; i <= 10; i++) {
            System.out.println(i);
        }
        //Using While Loop
        System.out.println("Using While Loop");
        int i = 1;
        while (i <= 10) {
            System.out.println(i);
            i++;
        }
        //Using Do While Loop
        System.out.println("Using Do While Loop");
        int j = 1;
        do {
            System.out.println(j);
            j++;
        } while (j <= 10);
    }
}
```

2) Write a program to print sum of N numbers using for and while loop. (A)

```
import java.util.Scanner;

public class Pr2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n = scanner.nextInt();
        System.out.println("Using For Loop");
```

```
        int sum = 0;
        for (int i = 1; i <= n; i++) {
            sum += i;
        }
        System.out.println("Sum = " + sum);
        System.out.println("Using while Loop");
        int sum1 = 0;
        int i = 1;
        while (i <= n) {
            sum1 += i;
            i++;
        }
        System.out.println("Sum = " + sum1);

    }
}
```

3) Write a program to find factorial of the given number. (A)

```
import java.util.Scanner;


public class Pr3 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n = sc.nextInt();
        int fact=0;
        for (int i = n; i <=1; i--) {
            fact = fact * i;
        }
        System.out.println("Factorial is : "+fact);
    }
}
```

4) Write a program to check whether the given number is prime or not without using function. (B)

```
import java.util.Scanner;

public class Pr4 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
```

```
        System.out.println("Enter a number to check: ");
        int n = sc.nextInt();
        int count=0;
        for (int i = 1; i <= n; i++) {
            if (n % i == 0) {
                count++;
            }
        }
        if (count == 2) {
            System.out.println( "prime number.");
        } else {
            System.out.println("not a prime number.");
        }
    }
}
```

5) Write a program to print given number in reverse order. (C)

```
import java.util.Scanner;
public class Pr5 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n = sc.nextInt();
        int ans=0;

        while (n > 0) {
            int digit = n % 10;
            ans = (ans * 10) + digit;
            n = n / 10;
        }
        System.out.println("Reverse is: "+ans);
    }
}
```

6) Write a program to print following pattern using java. (C)

i)	ii)	iii)	iv)
*	12345	1	1
**	1234	0 1	2 3
***	123	0 1 0	4 5 6
****	12	1 0 1 0	7 8 9 10
*****	1	1 0 1 0 1	11 12 13 14 15

```
public class Pr6_1 {
    public static void main(String[] args) {
        for(int i = 0;i<5;i++){
```

```
            for(int j = 0;j<=i;j++){
               System.out.print("*");
            }
            System.out.println();
         }
      }
   }
```

```
public class Pr6_2 {
   public static void main(String[] args) {
      for (int i = 5; i >= 1; i--) {
         for (int j = 1; j <= i; j++) {
            System.out.print(j);
         }
         System.out.println();
      }
   }
}
```

```
public class Pr6_3 {
    public static void main(String[] args) {
      for (int i = 1; i <= 5; i++) {
         for (int j = 1; j <= i; j++) {
            System.out.print((i + j) % 2);
         }
         System.out.println();
      }
   }
}
```

```
public class Pr6_4 {

   public static void main(String[] args) {
      int sum=1;
       for (int i = 1; i <=5; i++) {
         for (int j = 1; j <= i; j++) {
            System.out.print(sum + " ");
            sum++;
         }
         System.out.println();
      }
   }
}
```

8 **break and continue statement**

1) Write a program to print numbers from 1 to 10, but stop when it reaches 5 using break. (A)

```
public class Pr1 {
   public static void main(String[] args) {
      for (int i = 1; i <=10; i++) {
       if(i==5)
         break;
       else
         System.out.println(i);
       }
   }
}
```

2) Write a program to print numbers from 1 to 10, but skip 5 using continue. (A)

```
public class Pr2 {
   public static void main(String[] args) {
      for (int i = 1; i <=10; i++) {
       if(i==5)
         continue;
       else
         System.out.println(i);
       }
   }

}
```

3) Write a program to print numbers from 1 to 10, but skip 5 and 8 using continue. (A)

```
public class Pr3 {
      public static void main(String[] args) {
      for (int i = 1; i <=10; i++) {
       if(i==5 || i==8)
         continue;
       else
         System.out.println(i);
       }
   }

}
```

4) Write a program to Stop a loop when number is divisible by 7. (B)

```
public class Pr4 {
```

```
public static void main(String[] args) {
  for (int i = 1; i <=20; i++) {
    if(i%7==0)
      break;
    else
      System.out.println(i);
  }
  }
}
```

9 **Demonstration of Function**

1) Write a program to calculate simple interest using method. (A)

```
import java.util.Scanner;

public class Pr1 {
  public static void main(String[] args) {
   Scanner sc = new Scanner(System.in);
   System.out.println("Enter Principal Amount, Rate of Interest , Time :");
   double p = sc.nextDouble();
   double r = sc.nextDouble();
   double n = sc.nextDouble();
   Pr1 obj = new Pr1();
   obj.calculateSimpleInterest(p, r, n);
  }
  void calculateSimpleInterest(double p, double r, double n) {
     double si = (p * r * n) / 100;
     System.out.println("Simple Intrest is : " + si);
  }

}
```

2) Write a program to find maximum number from given three numbers using method. (A)

```
import java.util.Scanner;

public class Pr2 {
  public static void main(String[] args) {
   Scanner sc = new Scanner(System.in);
   System.out.println("Enter 3 numbers:");
   int a = sc.nextInt();
   int b = sc.nextInt();
   int c = sc.nextInt();
   Pr2 obj = new Pr2();
   obj.getMax(a, b, c);
  }
  void getMax(int a, int b, int c) {
     if (a > b && a > c) {
        System.out.println("Maximum number is: " + a);
     } else if (b > a && b > c) {
        System.out.println("Maximum number is: " + b);
     } else {
        System.out.println("Maximum number is: " + c);
     }
  }
}
```

3) Write a program to find the factorial of given number using recursion. (A)

```
import java.util.Scanner;

public class Pr3 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter number to get Factorial:");
        int n = sc.nextInt();
        Pr3 obj = new Pr3();
        long ans = obj.getFactorial(n);
        System.out.println("Factorial of " + n + " is: " + ans);
     }

    long getFactorial(int n) {
        if (n < 0) return -1;
        if (n == 0 || n == 1) return 1;
        return n * getFactorial(n - 1);
    }
}
```

4) Write a program to generate Fibonacci series of N given number using method. (B)

```
import java.util.Scanner;

public class Pr4 {
   public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter n for Fibonacci series:");
    int n = sc.nextInt();
    Pr4 obj = new Pr4();
    obj.getFibonacci(n);
   }
   void getFibonacci(int n)
   {
        int a=0,b=1;
        System.out.println("Fibonacci Series:");
        System.out.println(a);
        System.out.println(b);
        for(int i = 0;i<n;i++)
        {
            int c = a+b;
            System.out.println(c);
            a=b;
```

```
            b=c;
        }
      }
    }
```

5) Write a program to accept a number and check whether the number is prime or not. Use method name check (int n). The method returns 1, if the number is prime otherwise, it returns 0. (C)

```
import java.util.Scanner;

public class Pr5 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a number to check if it is prime:");
        int n = sc.nextInt();
        Pr5 p = new Pr5();
        int ans = p.getPrime(n);
        if(ans==1)
        {
            System.out.println("prime number");
        }
        else
        {
            System.out.println("not a prime number");
        }
    }
    int getPrime(int n)
    {
        for(int i=2;i<n/2;i++)
        {
            if(n%i==0)
            {
                return 0;
            }
        }
        return 1;
    }
}
```

10 Implementation of Single and Multidimensional Array

1) Write a program that create an array, take the size of array from the user, take the array member from the user and display it using loop. (A)

```
import java.util.Scanner;

public class Pr1 {
  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter Size of Array:");
    int n = sc.nextInt();
    int[] arr = new int[n];
    System.out.println("Enter Elements of Array:");
    for (int i = 0; i < n; i++) {
      arr[i] = sc.nextInt();
    }
    System.out.println("Araay is:");
    for (int i = 0; i < n; i++) {
      System.out.println(arr[i]);
    }
  }
}
```

2) Write a program to count number of even or odd number from an array of N number. (A)

```
import java.util.Scanner;

public class Pr2 {
    public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter Size of Array:");
    int n = sc.nextInt();
    int odd = 0, even = 0;
    int[] arr = new int[n];
    System.out.println("Enter Elements of Array:");
    for (int i = 0; i < n; i++) {
      arr[i] = sc.nextInt();
      if (arr[i] % 2 == 0) {
        even++;
      } else {
        odd++;
      }
    }
    System.out.println("Number of Even Elements: " + even);
    System.out.println("Number of Odd Elements: " + odd);
```

```
    }

    }
```

3) Write a program to read values in two-dimensional array and print them in matrix form. (A)

```
import java.util.Scanner;

public class Pr3 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int[][] a = new int[3][3];
      System.out.println("Enter Elements of 3x3 Matrix:");
      for (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) {
            a[i][j] = sc.nextInt();
         }
      }
      System.out.println("Matrix is:");
      for (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) {
            System.out.print(a[i][j] + " ");
         }
         System.out.println();
      }
   }
}
```

4) Write a program to perform addition of 3*3 matrix. (A)

```
import java.util.Scanner;
public class Pr4 {
   public static void main(String[] args) {
      Scanner sc  = new Scanner(System.in);
      int[][] a= new int[3][3];
      int[][] b= new int[3][3];
      int[][] c= new int[3][3];
      System.out.println("Enter Elements of Matrix A:");
      for (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) {
            a[i][j] = sc.nextInt();
         }
      }
      System.out.println("Enter Elements of Matrix B:");
      for (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) {
```

```
                b[i][j] = sc.nextInt();
            }
        }
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                c[i][j] = a[i][j] + b[i][j];
            }
        }
        System.out.println("Sum of Matrix A and B is:");
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                System.out.print(c[i][j] + " ");
            }
            System.out.println();
        }
    }
}
```

5) Write a program to perform multiplication of two 3*3 matrix & display it in matrix form.

(A)

```
import java.util.Scanner;
public class Pr5 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int [][] a = new int[3][3];
        int [][] b = new int[3][3];
        int [][] c = new int[3][3];
        System.out.println("Enter Elements of Matrix A:");
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                a[i][j] = sc.nextInt();
            }
        }
        System.out.println("Enter Elements of Matrix B:");
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                b[i][j] = sc.nextInt();
            }
        }
        System.out.println("Multiplication of Matrix A and B is:");
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                c[i][j] = 0;
                for (int k = 0; k < 3; k++) {
```

```
                    c[i][j]= c[i][j] + a[i][k] * b[k][j];
                }
            }
        }

    }
}
```

6) Write a program to remove duplicate elements from an array. (B)

```
import java.util.Scanner;
public class Pr6 {
    public static void main(String[] args) {
        System.out.println("Enter Size of Array:");
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int a[] = new int[n];
        System.out.println("Enter Elements of Array:");
        for (int i = 0; i < n; i++) {
            a[i] = sc.nextInt();
        }
        System.out.println("Array is:");
        for (int i = 0; i < n; i++) {
            System.out.print(a[i] + " ");
        }
        System.out.println();
        System.out.println("After Removing Duplicates:");
        for (int i = 0; i < n; i++) {
            boolean isDuplicate = false;
            for (int j = 0; j < i; j++) {
                if (a[i] == a[j]) {
                    isDuplicate = true;
                    break;
                }
            }
            if (!isDuplicate) {
                System.out.print(a[i] + " ");
            }
        }
    }
}
```

7) Write a program to find the second largest and second smallest number in an array. (C)

```
import java.util.Scanner;

public class Pr7 {
```

```
public static void main(String[] args) {
  Scanner sc = new Scanner(System.in);
  System.out.println("Enter Size of Array:");
  int n = sc.nextInt();
  int[] a = new int[n];
  System.out.println("Enter Elements of Array:");
  for (int i = 0; i < n; i++) {
    a[i] = sc.nextInt();
  }
  System.out.println("Array is:");
  for (int i = 0; i < n; i++) {
    System.out.print(a[i] + " ");
  }
  int large = a[0];
  int small = a[0];
  int secondLarge = a[0];
  int secondSmall = a[0];
  for (int i = 1; i < n; i++) {
        if (a[i] > large) {
          secondLarge = large;
          large = a[i];
        } else if (a[i] < large && a[i] > secondLarge) {
          secondLarge = a[i];
        }
        if (a[i] < small) {
          secondSmall = small;
          small = a[i];
        } else if (a[i] > small && a[i] < secondSmall) {
          secondSmall = a[i];
        }
     }
  System.out.println("Second Largest Element: " + secondLarge);
  System.out.println("Second Smallest Element: " + secondSmall);

 }
}
```

11 **Searching and Sorting an array**

1) Write a program to search for an element in an array using linear search**.** (A)

```
import java.util.Scanner;
public class Pr1 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
```

```
        System.out.println("Enter Size of Array:");
        int n = sc.nextInt();
        int a[] = new int[n];
        System.out.println("Enter Elements of Array:");
        for (int i = 0; i < n; i++) {
           a[i] = sc.nextInt();
        }
        System.out.println("Enter Element to Search:");
        int ele = sc.nextInt();
        boolean isFound = false;
        for(int i=0;i<n;i++)
        {
           if(a[i]==ele)
           {
              isFound = true;
              break;
           }
        }
        if(isFound)
        {
           System.out.println("Found");
        }
        else
        {
           System.out.println("Not Found");
        }

     }
  }
```

2) Write a program to search for an element in an array using binary search**.** (A)

```
import java.util.Scanner;
public class Pr2 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter Size of Array:");
      int n = sc.nextInt();
      int a[] = new int[n];
      System.out.println("Enter Elements of Array (Enter in sorted order):");
      for (int i = 0; i < n; i++) {
         a[i] = sc.nextInt();
      }
      System.out.println("Enter Element to Search:");
      int ele = sc.nextInt();
      int low = 0;
      int high = n - 1;
```

```
        boolean isFound = false;
        while (low <= high) {
          int mid = (low + high) / 2;
          if (a[mid] == ele) {
            isFound = true;
            break;
          } else if (a[mid] < ele) {
            low = mid + 1;
          } else if (a[mid] > ele) {
            high = mid - 1;
          }
        }
        if (isFound) {
          System.out.println("Found");
        } else {
          System.out.println("Not Found");
        }
      }
    }
```

3) Write a program to sort given N numbers. (B)

```
import java.util.Scanner;
public class Pr3 {
  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter Size of Array:");
    int n = sc.nextInt();
    int a[] = new int[n];
    System.out.println("Enter elements of Array:");
    for (int i = 0; i < n; i++) {
      a[i] = sc.nextInt();
    }
    System.out.println("Sorted Array:");
    for(int i=0;i<n;i++)
    {
      for(int j=i+1;j<n;j++)
      {
        if(a[i]>a[j])
        {
          int temp = a[i];
          a[i] = a[j];
          a[j] = temp;
        }
      }
    }
```

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

12 **Perform programs using object oriented concepts (Part - I)**

1) Write a program in java to use of class, object and method. (A)

```
public class Pr1{
  public static void main(String[] args) {
    // object of class Demo
    System.out.println("Creating object of class Demo");
    Demo d = new Demo();
    d.display();

  }

}
class Demo{
  void display(){
    System.out.println("I am in Demo class");
  }
}
```

2) Create a class named Candidate with Candidate_ID, Candidate_Name, Candidate_Age, Candidate_Weight and Candidate_Height data members. Also create a method GetCandidateDetails() and DisplayCandidateDetails(). Create main method to demonstrate the Candidate class. (B)

```
import java.util.Scanner;

public class Pr2 {
  public static void main(String[] args) {
    Candidate cn = new Candidate();
    System.out.println("");
    cn.GetCandidateDetails();
    System.out.println("Candidate Details:");
    cn.DisplayCandidateDetails();

  }
}
```

```
class Candidate{
   int Candidate_ID,Candidate_Age;
   String Candidate_Name;
   double Candidate_Weight;
   double Candidate_Height;

   void GetCandidateDetails() {
     Scanner sc = new Scanner(System.in);
      System.out.println("Enter Candidate ID: ");
      Candidate_ID = sc.nextInt();
      System.out.println("Enter Candidate Name: ");
      Candidate_Name = sc.next();
      System.out.println("Enter Candidate Age: ");
      Candidate_Age = sc.nextInt();
      System.out.println("Enter Candidate Weight: ");
      Candidate_Weight = sc.nextDouble();
      System.out.println("Enter Candidate Height: ");
      Candidate_Height = sc.nextDouble();

   }
   void DisplayCandidateDetails() {
      System.out.println("Candidate ID: " + Candidate_ID);
      System.out.println("Candidate Name: " + Candidate_Name);
      System.out.println("Candidate Age: " + Candidate_Age);
      System.out.println("Candidate Weight: " + Candidate_Weight);
      System.out.println("Candidate Height: " + Candidate_Height);
   }
}
```

3) Create a class named Bank_Account with Account_No, User_Name, Email, Account_Type and Account_Balance data members. Also create a method GetAccountDetails() and DisplayAccountDetails(). Create main method to demonstrate the Bank_Account class. (C)

```
import java.util.Scanner;

public class Pr3 {
   public static void main(String[] args) {
      Bank_Account ba = new Bank_Account();
      System.out.println("Enter Bank Account Details:");
      ba.GetAccountDetails();
      System.out.println("Bank Account Details:");
      ba.DisplayAccountDetails();
```

```
    }
}
class Bank_Account {
    int Account_No;
    String User_Name;
    double Account_Balance;
    String Account_Type,email;

    void GetAccountDetails() {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter Account Number: ");
        Account_No = sc.nextInt();
        System.out.println("Enter Account Holder Name: ");
        User_Name = sc.next();
        System.out.println("Enter Account Balance: ");
        Account_Balance = sc.nextDouble();
        System.out.println("Enter Account Type: ");
        Account_Type = sc.next();
        System.out.println("Enter Email: ");
        email = sc.next();

    }
    void DisplayAccountDetails() {
        System.out.println("Account Number: " + Account_No);
        System.out.println("Account Holder Name: " + User_Name);
        System.out.println("Account Balance: " + Account_Balance);
        System.out.println("Account Type: " + Account_Type);
        System.out.println("Email: " + email);
    }
}
```

13 **Perform programs using object oriented concepts (Part - II)**

1) Write a program with following specifications: (A)
Class Name: Employee
Data Members: Employee_ID, Employee_Name, Designation, Age, Salary.
Member Functions: GetEmployeeDetails () and DisplayEmpolyeeDetails ().

```
import java.util.Scanner;

public class Pr1 {
  public static void main(String[] args) {
     Employee emp = new Employee();
     System.out.println("Enter Employee Details:");
     emp.GetEmployeeDetails();
     emp.DisplayEmployeeDetails();
   }
}

class Employee {
   int Employee_ID;
   String Employee_Name,Designation;
   int Age;
   double Salary;

   void GetEmployeeDetails() {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter Employee ID: ");
      Employee_ID = sc.nextInt();
      System.out.print("Enter Employee Name: ");
      Employee_Name = sc.nextLine();
      System.out.print("Enter Designation: ");
      Designation = sc.nextLine();
      System.out.print("Enter Age: ");
      Age = sc.nextInt();
      System.out.print("Enter Salary: ");
      Salary = sc.nextDouble();
   }

   void DisplayEmployeeDetails() {
      System.out.println("\n--- Employee Details ---");
      System.out.println("ID: " + Employee_ID);
      System.out.println("Name: " + Employee_Name);
      System.out.println("Designation: " + Designation);
      System.out.println("Age: " + Age);
      System.out.println("Salary: " + Salary);
   }
```

```
}
```

2) Write a class program with following specifications: (B)
Class Name: Student
Data Members: Enrollment_No, Student_Name, Semester, CPI and SPI Member Functions: GetStudentDetails () and DisplayStudentDetails ().

```
import java.util.Scanner;
public class Pr2 {
   public static void main(String[] args) {
      Student student = new Student();
      System.out.println("Enter Student Details:");
      student.GetStudentDetails();
      student.DisplayStudentDetails();
   }
}
class Student {
   int Enrollment_No;
   String Student_Name;
   int Semester;
   double CPI, SPI;

   void GetStudentDetails() {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter Enrollment No: ");
      Enrollment_No = sc.nextInt();
      System.out.print("Enter Student Name: ");
      Student_Name = sc.nextLine();
      System.out.print("Enter Semester: ");
      Semester = sc.nextInt();
      System.out.print("Enter CPI: ");
      CPI = sc.nextDouble();
      System.out.print("Enter SPI: ");
      SPI = sc.nextDouble();
   }

   void DisplayStudentDetails() {
      System.out.println("Student Details:");
      System.out.println("Enrollment No: " + Enrollment_No);
      System.out.println("Name: " + Student_Name);
      System.out.println("Semester: " + Semester);
      System.out.println("CPI: " + CPI);
      System.out.println("SPI: " + SPI);
   }
```

```
}
```

3) Write a program to create Circle class with area and perimeter function to find area and perimeter of circle. (C)

```
import java.util.Scanner;
public class Pr3 {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     Circle c = new Circle();
     System.out.println("Enter Radius of Circle:");
     double radius = sc.nextDouble();
     System.out.println("Area of Circle: " + c.area(radius));
     System.out.println("Perimeter of Circle: " + c.perimeter(radius));
  }
}

class Circle {
  double area(double r) {
     return 3.14 *(r * r);
  }

  double perimeter(double r) {
     return 2 * 3.14 * r;
  }
}
```

14 Implementation of built-in function of String & StringBuffer

1) Write a program to demonstrate the built-in function of String class. (e.g. length(), charAt(), concat(), indexOf(), equals(), valueOf(), toString (), trim(), substring()) (A)

```
public class Pr1 {
   public static void main(String[] args) {
      String str = "  Hello Welcome to Java World  ";
      System.out.println("Length: " + str.length());

      System.out.println("Character at index 6: " + str.charAt(6));

      String newStr = str.concat(" - Enjoy Coding");
      System.out.println("Concatenated: " + newStr);


      System.out.println("Index of 'Java': " + str.indexOf("Java"));
```

```
        System.out.println("Equals 'Hello Welcome to Java World'? " + str.equals("Hello
    Welcome to Java World"));


        int num = 100;
        String strVal = String.valueOf(num);
        System.out.println("String value of 100: " + strVal);


        System.out.println("toString(): " + str.toString());


        System.out.println("Trimmed: '" + str.trim() + "'");


        System.out.println("Substring (7 to 11): " + str.substring(7, 11));
      }
    }
```

2) Write a program to use of StringBuffer class methods. (e.g. append(), insert(), delete(), reverse(), charAt(), capacity(), toString() and replace()). (A)

```
    public class Pr2 {
      public static void main(String[] args) {
        StringBuffer sb = new StringBuffer("Java Programming");


        sb.append(" Programming");
        System.out.println("After append: " + sb);


        sb.insert(5, "is ");
        System.out.println("After insert: " + sb);


        sb.delete(5, 8);
        System.out.println("After delete: " + sb);


        System.out.println("Reversed: " + sb.reverse());


        System.out.println("Character at index 2: " + sb.charAt(2));
```

```
        System.out.println("Capacity: " + sb.capacity());


        System.out.println("StringBuffer as string: " + sb.toString());


        sb.reverse();
        sb.replace(0, 4, "Core");
        System.out.println("After replace: " + sb);
    }
}
```

3) Write a Java String program to print even length words. (B)

```
public class Pr3 {
    public static void main(String[] args) {
        String input = "Java is a powerful programming language";
        String[] words = input.split(" ");
        System.out.println("Even length words:");
        for (int i = 0; i < words.length; i++) {
            if (words[i].length() % 2 == 0) {
                System.out.println(words[i]);
            }
        }
    }
}
```

4) Write a program to implement a program to check if a string is a palindrome. (C)

```
import java.util.Scanner;

public class Pr4 {
    public static void main(String[] args) {
        System.out.println("Enter a string:");
        Scanner sc = new Scanner(System.in);
        String str = sc.nextLine();

        StringBuffer sb = new StringBuffer(str);
        sb.reverse();

        if (str.equals(sb.toString())) {
            System.out.println("The string is a palindrome.");
        } else {
            System.out.println("The string is not a palindrome.");
        }
```

```
    }
}
```

15 **Implementation of built-in function of Math class**

1) Write a program to demonstrate the built-in function of Math class. (e.g. min(), max(), random(), pow(), sqrt(), round(), ceil(), floor(), abs())(A)

```
public class Pr1 {
    public static void main(String[] args) {
        System.out.println("Min of 5 and 10: " + Math.min(5, 10));
        System.out.println("Max of 5 and 10: " + Math.max(5, 10));
        System.out.println("Random number (0.0 to 1.0): " + Math.random());
        System.out.println("2 raised to the power 3: " + Math.pow(2, 3));
        System.out.println("Square root of 16: " + Math.sqrt(16));
        System.out.println("Round of 5.6: " + Math.round(5.6));
        System.out.println("Ceil of 4.3: " + Math.ceil(4.3));
        System.out.println("Floor of 4.7: " + Math.floor(4.7));
        System.out.println("Absolute of -10: " + Math.abs(-10));
    }
}
```

2) Write a program to print the largest number from the three given number using Math class function. (A)

```
import java.util.Scanner;

public class Pr2 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        System.out.print("Enter first number: ");
        int a = sc.nextInt();

        System.out.print("Enter second number: ");
        int b = sc.nextInt();

        System.out.print("Enter third number: ");
        int c = sc.nextInt();

        int largest = Math.max(a, Math.max(b, c));
```

```
            System.out.println("The largest number is: " + largest);
        }
    }
```

3) Write a program to check that whether the given number is Armstrong or not using Math class function. (B)

```
import java.util.Scanner;

public class Pr3 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = sc.nextInt();

        int original = num;
        int digits = String.valueOf(num).length();
        int sum = 0;

        while (num > 0) {
            int rmd = num % 10;
            sum += Math.pow(rmd, digits);
            num /= 10;
        }

        if (sum == original) {
            System.out.println(original + " is an Armstrong number.");
        } else {
            System.out.println(original + " is not an Armstrong number.");
        }
    }
}
```

16 Implementation of built-in function of Nested class, Inner class and Wrapper class

1) Write a program to demonstrate concepts of autoboxoing and unboxing using wrapper class. (A)
2) Write a program to demonstrate concept of nested class. (B)
3) Write a program to demonstrate anonymous inner class. (C)

17	**Demonstration of Method overloading and Constructor** 1) Write a program that calculates area of circle, triangle and square using method overloading. (A) 2) Write a program to use of default and parameterized Constructor. (A) 3) Write a program to use of copy Constructor. (B) 4) Write a program to demonstrate constructor overloading by creating multiple constructors with different parameters. (C)

18	**Implementation of this and static keyword** 1) Write a program to demonstrate use of this keyword. (A) 2) Write a program to demonstrate use of static keyword (A) 3) Write a program static block which will be executed before main() method in a class. Also demonstrate the static method. (B) 4) Check whether this can access the Static variables of the class or not. (C)
19	**Implementation of types of inheritance** 1) Write a program to demonstrate single inheritance, multilevel inheritance and hierarchical inheritance. (A) 2) Create a class named shape. In this class, we have three subclasses circle, triangle and square. Write a program to display area of all three classes. (B) 3) Write a program for implementing single inheritance which creates one class account_details for getting account information and another class interest for calculating and displaying total interest from the data inserted from account details. (C)
20	**Implementation of function overriding, super and final keywords** 1) Demonstrate the Method overriding using example. (A) 2) Demonstrate the use of Super Keyword to access constructor, function and variable of immediate parent class from the subclass. (A) 3) Demonstrate the use of Final Keyword to prevent function overriding, variable modification and extraction of a class in sub class. (B) 4) Create a class named 'Member' having the following members: (C) 1 - Name 2 - Age 3 - Phone number 4 - Address 5 – Salary It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inherits the 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same along with specialization and department respectively.
21	**Implementation of the use of abstract class** 1) Create an abstract class Shape with method area(). Create two class Rectangle and Circle which extend this Shape class and calculate area of Rectangle and Circle. (A) 2) An abstract Vegetable class has three subclasses named Potato, Brinjal and Tomato. Write a program that demonstrates how to establish this class hierarchy. Declare one instance variable of type String that indicates the color of a vegetable. Create and display instances of these objects. Override the toString() method of object to return a string

	with the name of vegetable and its color. (A)
22	**Implementation of the use of interface** 1) Write a program in java to perform multiple inheritances using the interface. (A) 2) The Transport interface declares a deliver() method. The abstract class Animal is the super class of the Tiger, Camel, Deer and Donkey classes. The Transport interface is implemented by the Camel and Donkey classes. Write a test program that initialize an array of four Animal objects. If the object implements the Transport interface, the deliver () method is invoked. (A) 3) Declare a class called book having author_name as private data member. Extend book class to have two sub classes called book_publication & paper_publication. Each of these classes have private member called title. Write a program to show usage of dynamic method dispatch (dynamic polymorphism) to display book or paper publications of given author. Use command line arguments for inputting data. (B)
23	**Implementation of Packages and Access Specifiers** 1) Write a program to demonstrate the use of private, public, protected and default access modifiers using two package. (A) 2) Assume that there are two packages, student and exam. A student package contains Student class and the exam package contains Result class. Write a program that generates mark sheet for students. (A) 3) Create class MathOperation in calculator package contains four methods Addition, Subtraction, Multiplication and Division which accept two numbers and perform respective operation. Create class DemoOperation in demoOperation package and call all the method of MathOperation class and display result. (B) 4) Define a class A in package apack. In class A, three variables are defined of access modifiers protected, private and public. Define class B in package bpack which extends A and write display method which accesses variables of class A. Define class C in package cpack which has one method display() in that create one object of class A and display its variables. Define class ProtectedDemo in package dpack in which write main () method. Create objects of class B and C and class display method for both these objects. (B)
24	**Implementation of exception handling mechanism** 1) Write a program to demonstrate try, catch, and finally blocks. (A) 2) Write a program to handle multiple exceptions. (A) 3) Write a program that uses the throw and throws keyword. (A) 4) Write a program to create and handle a user-defined exception. (A) 5) Write a program to create Account class, which is representing a bank account where we can deposit and withdraw money. if we want to withdraw money which exceed our bank balance? We will not be allowed, create a customize exception to handle above situation and display proper error message. (C) 6) Write a program to accept N integer numbers from the command line. Raise and handle exceptions for following cases: (C) - when a number is – ve.

	- when a number is evenly divisible by 10. - when a number is greater than 1000 and less than 2000. -when a number is greater than 7000 Skip the number if an exception is raised for it, otherwise add it to find total sum.
25	**Implementation of File, FileReader and FileWriter class using java** 1) Write a program to create a file to the specified location. (Use File Class) (A) 2) Write a program to copy the content of one file to another file and console. (Use FileReader and File Writer Class) (A) 3) Write a program to Merge the content of two files into single file. (B) 4) Write a program to Copy the content of one file into multiple file. (C)
26	**Demonstrate of FileInputStream, FileOutputStream class** 1) Write a program to demonstrate FileInputStream and FileOutputStream class. (A) 2) Write a program to demonstrate BufferedReader and BufferedWriter class. (A) 3) Write a program to demonstrate BufferedInputStream and BufferdOutputStream class. (B)