

CYCLE - 4

1. Create a Graphics package that has classes and interfaces for figures Rectangle, Triangle, Square and Circle. Test the package by finding the area of these figures.

CODE :

```
import package_graphics.*;
import java.util.Scanner;
public class Q1
{
    public static void main(String []args)
    {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 22/06/2023");
        package_graphics testObj = new package_graphics();
        int l,h,r,a,c,d;
        Scanner s=new Scanner(System.in);
        System.out.println("Enter the length for rectangle");
        l=s.nextInt();
        System.out.println("Enter the breadth for rectangle");
        h=s.nextInt();
        System.out.println("Enter the radius of circle");
        r=s.nextInt();
        System.out.println("Enter the side for Square");
        a=s.nextInt();
        System.out.println("Enter the breadth for triangle");
        c=s.nextInt();
        System.out.println("Enter the height for triangle");
        d=s.nextInt();
        System.out.println("Area of rectangle="+testObj.recArea(l,h));
        System.out.println("Area of circle="+testObj.cirArea(r));
        System.out.println("Area of square="+testObj.squArea(a));
        System.out.println("Area of triangle="+testObj.triArea(c,d));
    }
}
```

```

package_graphics :
package package_graphics;
interface interface_graphics
{
public float recArea(int l, int h);
public float cirArea(int r);
public float squArea(int a);
public float triArea(int l, int h);
}
public class package_graphics implements interface_graphics
{
public float recArea(int l, int h)
{
return l*h;
}
public float cirArea(int r)
{
return r*r*(float)3.14;
}
public float squArea(int a)
{
return a*a;
}
public float triArea(int l, int h)
{
return l*h*(float)(.5);
}
}

```

OUTPUT:

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q1$ javac Q1.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q1$ java Q1
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 22/06/2023
Enter the length for rectangle
2
Enter the breadth for rectangle
2
Enter the radius of circle
5
Enter the side for Square
2
Enter the breadth for triangle
4
Enter the height for triangle
5
Area of rectangle=4.0
Area of circle=78.5
Area of square=4.0
Area of triangle=10.0

```

2. Create an Arithmetic package that has classes and interfaces for the 4 basic arithmetic operations. Test the package by implementing all operations on two given numbers .

CODE :

```
import arithmetic.ArithmeticOperations;
import java.util.Scanner;

public class Q2 {
    public static void main(String[] args) {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 26/06/2023");
        ArithmeticOperations operations = new ArithmeticOperations();

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first number: ");
        double num1 = scanner.nextDouble();

        System.out.print("Enter the second number: ");
        double num2 = scanner.nextDouble();

        System.out.println("Addition: " + operations.add(num1, num2));
        System.out.println("Subtraction: " + operations.subtract(num1, num2));
        System.out.println("Multiplication: " + operations.multiply(num1, num2));
        System.out.println("Division: " + operations.divide(num1, num2));

    }
}
```

ArithmeticOperations.java :

```
package arithmetic;

public class ArithmeticOperations implements Addition, Subtraction, Multiplication, Division {
    @Override
```

```
public double add(double num1, double num2) {  
    return num1 + num2;  
}  
  
@Override  
public double subtract(double num1, double num2) {  
    return num1 - num2;  
}  
  
@Override  
public double multiply(double num1, double num2) {  
    return num1 * num2;  
}  
  
@Override  
public double divide(double num1, double num2) {  
    if (num2 == 0) {  
        throw new ArithmeticException("Division by zero error!");  
    }  
    return num1 / num2;  
}  
}
```

Addition.java :

```
package arithmetic;  
public interface Addition {  
    public double add(double num1, double num2);  
}
```

Multiplication.java :

```
package arithmetic;  
public interface Multiplication {  
    public double multiply(double num1, double num2);  
}
```

Division.java :

```
package arithmetic;  
public interface Division {  
    public double divide(double num1, double num2);  
}
```

Subtraction.java :

```
package arithmetic;  
public interface Subtraction {  
    public double subtract(double num1, double num2);  
}
```

OUTPUT :

```
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q2$ javac Q2.java  
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q2$ java Q2  
Name : Anna Jose  
Register Number : SJC22MCA-2008  
Course Name : Object Oriented Programming Lab  
Course Code : 20MCA132  
Date : 26/06/2023  
Enter the first number: 2  
Enter the second number: 5  
Addition: 7.0  
Subtraction: -3.0  
Multiplication: 10.0  
Division: 0.4
```

3. Write a user defined exception class to authenticate the user name and password.**CODE :**

```
import java.util.Scanner;
class authException extends Exception
{
public authException(String s) {
super(s);
}
}
public class Q3
{
public static void main(String[] args){
System.out.println("Name : Anna Jose");
System.out.println("Register Number : SJC22MCA-2008");
System.out.println("Course Name : Object Oriented Programming Lab");
System.out.println("Course Code : 20MCA132");
System.out.println("Date : 22/06/2023");
String username = "student";
String passcode = "student123";
String user_name,password;
Scanner sc = new Scanner(System.in);
try
{
System.out.println("Enter the username:");
user_name = sc.nextLine();

System.out.println("Enter the password:");
password = sc.nextLine();
if(username.equals(user_name) && passcode.equals(password))
{
System.out.println("Authentication successful...");
}
else
throw new authException("Invalid user credentials");

}
catch(authException e)
{
}
```

```
System.out.println("Exception caught "+e);  
}  
}  
}
```

OUTPUT:

```
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q3$ javac Q3.java  
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q3$ java Q3  
Name : Anna Jose  
Register Number : SJC22MCA-2008  
Course Name : Object Oriented Programming Lab  
Course Code : 20MCA132  
Date : 22/06/2023  
Enter the username:  
student  
Enter the password:  
student123  
Authentication successful...
```

4. Find the average of N positive integers, raising a user defined exception for each negative input.

CODE :

```
import java.util.Scanner;
class NegException extends Exception{
    public NegException(String s){
        super(s);
    }
}
public class Average {
    public static void main(String[] args){
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 22/06/2023");
        int i;
        double sum=0,avg=0;
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter n numbers:");
        int n=sc.nextInt();
        for(i=1;i<=n;i++){
            try{
                System.out.println("Enter number"+i);
                int a=sc.nextInt();
                if(a<0){
                    i--;
                    throw new NegException("Negative numbers not allowed, Try again");
                }
                else{
                    sum=sum+a;
                }
            }
            catch(NegException e){
                System.out.println("NEGATIVE EXCEPTION OCCURED:"+e);
            }
        }
        avg=sum/n;
```



```
System.out.println("Average is "+avg);  
sc.close();  
}  
}
```

OUTPUT :

```
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q4$ javac Average.java  
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q4$ java Average  
Name : Anna Jose  
Register Number : SJC22MCA-2008  
Course Name : Object Oriented Programming Lab  
Course Code : 20MCA132  
Date : 22/06/2023  
Enter n numbers:  
3  
Enter number1  
1  
Enter number2  
2  
Enter number3  
3  
Average is 2.0
```

5. Define 2 classes; one for generating multiplication table of 5 and other for displaying first N prime numbers. Implement using threads (Thread class) .

CODE :

```
import java.util.Scanner;
class prime extends Thread{
    int num;
    public prime(int n){
        this.num=n;
    }
    public void run(){
        int x, y, flg;
        System.out.println("All the Prime numbers within 1 and " + num + " are:");
        for (x = 1; x <= num; x++) {
            if (x == 1 || x == 0)
                continue;
            flg = 1;
            for (y = 2; y <= x / 2; ++y) {
                if (x % y == 0) {
                    flg = 0;
                    break;
                }
            }
            if (flg == 1)
                System.out.print("prime number =" + x + "\n ");
        }
    }
}
class mul extends Thread{
    public void run(){
        System.out.println("\n");
        for(int i =0;i<11;i++){
            System.out.println("5*" + i + " = " + 5*i);

        }
    }
}
public class Q5{
    public static void main(String[] args) {
```

```

        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 26/06/2023");
        System.out.println("Enter The number");
        Scanner sc = new Scanner(System.in);
        int number = sc.nextInt();
        mul obj1 = new mul();
        obj1.start();
        prime obj2 = new prime(number);
        obj2.start();
    }
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q5$ javac Q5.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q5$ java Q5
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 26/06/2023
Enter The number
5

5*0 = 0
5*1 = 5
5*2 = 10
5*3 = 15
5*4 = 20
5*5 = 25
5*6 = 30
5*7 = 35
5*8 = 40
5*9 = 45
5*10 = 50
All the Prime numbers within 1 and 5 are:
prime number =2
prime number =3
prime number =5

```

6. Define 2 classes; one for generating Fibonacci numbers and other for displaying even numbers in a given range. Implement using threads. (Runnable Interface)

CODE :

```
import java.util.Scanner;
class Fib extends Thread{
    int f,n1=0,n2=1,n3;
    Fib(int c){
        this.f=c;
    }
    public void run(){
        System.out.println("fib is "+n1);
        System.out.println("fib is "+n2);
        for(int i=2;i<this.f;++i) {
            n3=n1+n2;
            System.out.println("fib is "+n3);
            n1=n2;
            n2=n3;
        }
    }
}

class even extends Thread{
    int range;
    even(int range){
        this.range=range;
    }
    public void run(){
        for(int i=0;i<this.range;i++){
            if(i%2==0){
                System.out.println("even num is "+i);
            }
        }
    }
}

public class MultiThread {
    public static void main(String [] args){
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
    }
}
```

```
System.out.println("Course Code : 20MCA132");
System.out.println("Date : 23/06/2023");
int c,range;
Scanner sc=new Scanner(System.in);
System.out.println("enter the count of Fibinooci");
c=sc.nextInt();
Fib fi=new Fib(c);
System.out.println("enter the range of even number");
range=sc.nextInt();
even ev = new even(range);
fi.start();
ev.start();
}
}
```

OUTPUT :

```
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q6$ javac MultiThread.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q6$ java MultiThread
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 23/06/2023
enter the count of Fibinooci
5
enter the range of even number
5
fib is 0
fib is 1
fib is 1
fib is 2
fib is 3
even num is 0
even num is 2
```

7. Producer/Consumer using ITC .**CODE :**

```
import java.util.LinkedList;
class Buffer {
    private LinkedList<Integer> buffer;
    private int capacity;
    public Buffer(int capacity) {
        this.buffer = new LinkedList<>();
        this.capacity = capacity;
    }
    public void produce(int value) throws InterruptedException {
        synchronized (this) {
            while (buffer.size() == capacity) {
                wait();
            }
            buffer.add(value);
            System.out.println("Produced: " + value);
            notifyAll();
        }
    }
    public void consume() throws InterruptedException {
        synchronized (this) {
            while (buffer.isEmpty()) {
                wait();
            }
            int value = buffer.removeFirst();
            System.out.println("Consumed: " + value);
            notifyAll();
        }
    }
}

class Producer implements Runnable {
    private Buffer buffer;
    private int numProductions;

    public Producer(Buffer buffer, int numProductions) {
        this.buffer = buffer;
    }
}
```

```

        this.numProductions = numProductions;
    }
    @Override
    public void run() {
        for (int i = 0; i < numProductions; i++) {
            try {
                buffer.produce(i);
                Thread.sleep(1000); // Simulate production time
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
}

class Consumer implements Runnable {
    private Buffer buffer;
    private int numConsumptions;

    public Consumer(Buffer buffer, int numConsumptions) {
        this.buffer = buffer;
        this.numConsumptions = numConsumptions;
    }
    @Override
    public void run() {
        for (int i = 0; i < numConsumptions; i++) {
            try {
                buffer.consume();
                Thread.sleep(2000); // Simulate consumption time
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
}

public class ProducerConsumerExample {
    public static void main(String[] args) {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
    }
}

```

```

System.out.println("Date : 27/06/2023");
System.out.println("-----OUTPUT-----");
    Buffer buffer = new Buffer(5);
    int numProductions = 10;
    int numConsumptions = 10;
    Producer producer = new Producer(buffer, numProductions);
    Consumer consumer = new Consumer(buffer, numConsumptions);
    Thread producerThread = new Thread(producer);
    Thread consumerThread = new Thread(consumer);
    producerThread.start();
    consumerThread.start();
}
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q7$ javac ProducerConsumerExample.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q7$ java ProducerConsumerExample
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 27/06/2023
-----OUTPUT-----
Produced: 0
Consumed: 0
Produced: 1
Consumed: 1
Produced: 2
Produced: 3
Consumed: 2
Produced: 4
Produced: 5
Consumed: 3
Produced: 6
Produced: 7
Consumed: 4
Produced: 8
Produced: 9
Consumed: 5
Consumed: 6
Consumed: 7
Consumed: 8
Consumed: 9

```

8. Program to create a generic stack and do the Push and Pop operations.**CODE :**

```

import java.util.*;
class operations{

    public void operation()
    {

        int top = -1, ch, n, e;
        Scanner inp = new Scanner(System.in);
        System.out.println("Enter Size of Stack");
        n = inp.nextInt();
        int size = n - 1;
        int[] arr = new int[n];

        do {
            System.out.println("\n===== \n MENU : \n1.push \n2.pop \n3.Display
\n4.Exit \n=====");
            System.out.println("Enter your choice");
            ch = inp.nextInt();
            switch(ch)
            {
                case 1 :
                    if(top == size)
                    {
                        System.out.println(" *** Stack is Full *** ");
                    }
                    else
                    {
                        System.out.println("Enter Element : ");
                        e = inp.nextInt();
                        top++;
                        arr[top] = e;
                    }
                    break;

                case 2 :

```

```

        if(top == -1)
        {
            System.out.println("\n*** Stack is empty *** ");

        }
        else
        {

            System.out.println("\n" + arr[top] + " is removed ");
            top--;

        }
        break;

    case 3 :
        if(top == -1)
        {
            System.out.println(" *** Stack is empty ***");
        }
        else
        {
            System.out.println("\n*** Stack : ***\n");
            for(int i=top;i>=0;i--)
            {
                System.out.println(" " +arr[i]);
                System.out.println("-----");
            }
        }
        break;

    case 4 :
        System.exit(0);

    default : System.out.println("Invalid Choice");

    }
}while(ch !=4);

```

```

    }
}

public class Q8 {

    public static void main(String[] args) {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 22/06/2023");
        operations obj = new operations();
        obj.operation();
    }
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q8$ javac Q8.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q8$ java Q8
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 22/06/2023
Enter Size of Stack
3

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
1
Enter Element :
1

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
1
Enter Element :
2

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
1
Enter Element :
2

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
1
Enter Element :
2

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
2
2 is removed

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
1
Enter Element :
3

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
3
*** Stack : ***
3
-----
2
-----
1
-----

=====
MENU :
1.push
2.pop
3.Display
4.Exit
=====
Enter your choice
4

```

9. Using generic method perform Bubble sort.**CODE :**

```
import java.util.*;
class driver {

    void sort(int arr[])
    {
        int n = arr.length;
        for(int i =0;i < n-1;i++)
        {
            for(int j=0;j<n-i-1;j++)
            {
                if(arr[j] > arr[j+1])
                {
                    int temp = arr[j];
                    arr[j]=arr[j+1];
                    arr[j+1]= temp;
                }
            }
        }
    }

    void display(int arr[])
    {
        System.out.println("Sorted Array :");
        int n = arr.length;
        for(int i=0;i<n;i++)
        {
            System.out.print(arr[i]+ " ");
        }
    }

    public static void main(String[] args)
    {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
    }
}
```

```

        System.out.println("Date : 22/06/2023");
        int n,e;
        System.out.println("Enter size of Array :");
        Scanner inp =new Scanner(System.in);
        n = inp.nextInt();
        int[] arr = new int[n];
        for(int i=0;i<n;i++)
        {
            System.out.println("Enter element :");
            e = inp.nextInt();
            arr[i]=e;
        }

        driver ob = new driver();
        ob.sort(arr);
        ob.display(arr);

    }
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q9$ javac driver.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q9$ java driver
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 22/06/2023
Enter size of Array :
5
Enter element :
1
Enter element :
9
Enter element :
8
Enter element :
5
Enter element :
3
Sorted Array :
1 3 5 8 9 (base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q9$ █

```

10. Maintain a list of Strings using ArrayList from collection framework, perform built-in operations.

CODE :

```
import java.util.*;
public class driver {
    public static void main(String[] args) {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 22/06/2023");
        ArrayList<String> obj = new ArrayList<String>();
        obj.add("alpha");
        obj.add("beta");
        obj.add("gamma");
        obj.add("phi");
        System.out.println("\n Original ArrayList:");
        for(String str:obj)
            System.out.println(str);
        obj.add(1, "hamiltoinan");
        System.out.println("\n ArrayList after add operation:");
        for(String str:obj)
            System.out.println(str);
        obj.remove("hamiltoinan");
        System.out.println("\n ArrayList after remove operation:");
        for(String str:obj)
            System.out.println(str);
        obj.remove(3);
        System.out.println("\n Final ArrayList:");
        for(String str:obj)
            System.out.println(str);
        Collections.sort(obj);
        System.out.println("\n ArrayList after sorting:");
        for (String str : obj)
            System.out.println(str);
        System.out.println("\n Object at index 2:"+obj.get(2));
        System.out.println("\n Six is in the ArrayList :"+obj.contains("degree"));
        System.out.println("\n Two is in the ArrayList :"+obj.contains("dell"));
    }
}
```

```
        System.out.println("\n Size of the ArrayList:"+obj.size());
        obj.clear();
        System.out.println("\n** ArrayList Removed **");
    }
}
```

OUTPUT :

```
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q10$ java driver
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 22/06/2023
```

```
    Original ArrayList:
aplha
beta
gamma
phi
```

```
    ArrayList after add operation:
aplha
hamiltoinan
beta
gamma
phi
```

```
    ArrayList after remove operation:
aplha
beta
gamma
phi
```

```
    Final ArrayList:
aplha
beta
gamma
```

```
    ArrayList after sorting:
aplha
beta
gamma
```

```
    Object at index 2:gamma
```

```
    Six is in the ArrayList :false
```

```
    Two is in the ArrayList :false
```

```
    Size of the ArrayList:3
```

```
** ArrayList Removed **
```

11. Program to remove all the elements from a linked list .**CODE :**

```

import java.util.*;
public class Q11 {
    public static void main(String[] args){
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 26/06/2023 ");
        LinkedList<String> L=new LinkedList<>();
        L.add("JAVA");
        L.add("PYTHON");
        L.add("CSS");
        L.add(0,"PROGRAMING LANGUAGE");
        System.out.println(L);
        L.remove("CSS");
        System.out.println(L);
        L.remove(2);
        System.out.println(L);
        L.removeLast();
        System.out.println(L);
        L.removeFirst();
        System.out.println(L);
    }
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q11$ javac Q11.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q11$ java Q11
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 26/06/2023
[PROGRAMING LANGUAGE, JAVA, PYTHON, CSS]
[PROGRAMING LANGUAGE, JAVA, PYTHON]
[PROGRAMING LANGUAGE, JAVA]
[PROGRAMING LANGUAGE]
[]

```

12. Program to remove an object from the Stack when the position is passed as parameter .**CODE :**

```

import java.util.*;
public class Q12 {
    public static void main(String[] args) {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 26/06/2023");
        Stack<Integer> st = new Stack<>();
        st.push(12);
        st.push(67);
        st.push(89);
        st.push(23);
        System.out.println("Stack = "+st);
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the position : ");
        int x = sc.nextInt();
        st.remove(x);
        System.out.println("Stack = "+st);
    }
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q12$ javac Q12.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q12$ java Q12
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 26/06/2023
Stack = [12, 67, 89, 23]
Enter the position :
2
Stack = [12, 67, 23]

```

13. Program to demonstrate the creation of queue object using the PriorityQueue class .**CODE :**

```
import java.util.PriorityQueue;
public class Q13 {
    public static void main(String[] args) {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 26/06/2023");
        PriorityQueue <Integer> pq = new PriorityQueue<>();
        pq.add(10);
        pq.add(20);
        pq.add(15);
        System.out.println(pq);
        System.out.println(pq.peek());
        System.out.println(pq.poll());
        System.out.println(pq.peek());
    }
}
```

OUTPUT :

```
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q13$ javac Q13.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q13$ java Q13
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 26/06/2023
[10, 20, 15]
10
10
15
```

14. Program to demonstrate the addition and deletion of elements in deque .**CODE :**

```
import java.util.Deque;
import java.util.LinkedList;
import java.util.Scanner;
public class Q14 {
    public static void main(String[] args) {
        Deque<Integer> deque = new LinkedList<>();

        Scanner scanner = new Scanner(System.in);
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 26/06/2023");
        while (true) {
            System.out.println("1. Add element at the front");
            System.out.println("2. Add element at the end");
            System.out.println("3. Remove element from the front");
            System.out.println("4. Remove element from the end");
            System.out.println("5. Print elements in the deque");
            System.out.println("6. Exit");
            System.out.print("Enter your choice: ");
            int choice = scanner.nextInt();

            switch (choice) {
                case 1:
                    System.out.print("Enter the element to add at the front: ");
                    int elementFront = scanner.nextInt();
                    deque.addFirst(elementFront);
                    System.out.println("Element added at the front.");
                    break;
                case 2:
                    System.out.print("Enter the element to add at the end: ");
                    int elementEnd = scanner.nextInt();
                    deque.addLast(elementEnd);
                    System.out.println("Element added at the end.");
                    break;
```

```
        case 3:
            if (!deque.isEmpty()) {
                int removedFront = deque.removeFirst();
                System.out.println("Element removed from the front: " + removedFront);
            } else {
                System.out.println("Deque is empty. No element to remove from the front.");
            }
            break;
        case 4:
            if (!deque.isEmpty()) {
                int removedEnd = deque.removeLast();
                System.out.println("Element removed from the end: " + removedEnd);
            } else {
                System.out.println("Deque is empty. No element to remove from the end.");
            }
            break;
        case 5:
            System.out.println("Elements in the deque:");
            for (int element : deque) {
                System.out.println(element);
            }
            break;
        case 6:
            System.out.println("Exiting the program.");
            scanner.close();
            System.exit(0);
        default:
            System.out.println("Invalid choice. Please try again.");
    }
}
}
```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q14$ javac Q14.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q14$ java Q14
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 26/06/2023
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 1
Enter the element to add at the front: 1
Element added at the front.
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 1
Enter the element to add at the front: 2
Element added at the front.
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 2
Enter the element to add at the end: 3
Element added at the end.
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 2
Enter the element to add at the end: 4
Element added at the end.
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 3
Element removed from the front: 2
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 4
Element removed from the end: 4
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 5
Elements in the deque:
1
3
1. Add element at the front
2. Add element at the end
3. Remove element from the front
4. Remove element from the end
5. Print elements in the deque
6. Exit
Enter your choice: 6
Exiting the program.

```

15. Program to demonstrate the creation of Set object using the LinkedHashSet class .**CODE :**

```

import java.util.LinkedHashSet;
import java.util.Set;
public class Q15 {
public static void main(String[] args) {
    System.out.println("Name : Anna Jose");
    System.out.println("Register Number : SJC22MCA-2008");
    System.out.println("Course Name : Object Oriented Programming Lab");
    System.out.println("Course Code : 20MCA132");
    System.out.println("Date : 27/06/2023");
    Set<String> set = new LinkedHashSet<>();
    set.add("Apple");
    set.add("Banana");
    set.add("Orange");
    set.add("Apple");
    System.out.println("-----OUTPUT-----");
    System.out.println("Set elements: " + set);
    boolean containsBanana = set.contains("Banana");
    System.out.println("Contains 'Banana'? " + containsBanana);
    boolean removedOrange = set.remove("Orange");
    System.out.println("Removed 'Orange'? " + removedOrange);
    System.out.println("Set after removal: " + set);
}
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q15$ javac Q15.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q15$ java Q15
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 27/06/2023
-----OUTPUT-----
Set elements: [Apple, Banana, Orange]
Contains 'Banana'? true
Removed 'Orange'? true
Set after removal: [Apple, Banana]

```

16. Write a Java program to compare two hash set .**CODE :**

```

import java.util.*;
public class CompareHash {
public static void main(String[] args) {
System.out.println("Name : Anna Jose");
System.out.println("Register Number : SJC22MCA-2008");
System.out.println("Course Name : Object Oriented Programming Lab");
System.out.println("Course Code : 20MCA132");
System.out.println("Date : 23/06/2023");
HashSet<String> h_set = new HashSet<String>();
h_set.add("Red");
h_set.add("Green");
h_set.add("Black");
h_set.add("White");
HashSet<String>h_set2 = new HashSet<String>();
h_set2.add("Red");
h_set2.add("Pink");
h_set2.add("Black");
h_set2.add("Orange");
HashSet<String>result_set = new HashSet<String>();
for (String element : h_set){
System.out.println(h_set2.contains(element) ? "Yes" : "No");
}
}}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q16$ javac CompareHash.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q16$ java CompareHash
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 23/06/2023
Yes
No
Yes
No

```

17. Program to demonstrate the working of Map interface by adding, changing and removing elements .**CODE :**

```
import java.util.HashMap;
import java.util.Map;
import java.util.Scanner;
public class Q17{
    public static void main(String[] args) {
        Map<String, Integer> map = new HashMap<>();
        Scanner scanner = new Scanner(System.in);
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 27/06/2023");
        System.out.print("Enter the number of elements to add: ");
        int numElements = scanner.nextInt();
        scanner.nextLine();
        System.out.println("Enter the elements (key-value pairs):");
        for (int i = 0; i < numElements; i++) {
            String key = scanner.nextLine();
            int value = scanner.nextInt();
            scanner.nextLine();
            map.put(key, value);
        }
        System.out.println("Initial Map:");
        printMap(map);
        System.out.print("Enter the key to change the value: ");
        String keyToChange = scanner.nextLine();
        if (map.containsKey(keyToChange)) {
            System.out.print("Enter the new value: ");
            int newValue = scanner.nextInt();
            scanner.nextLine();
            map.put(keyToChange, newValue);
            System.out.println("Value changed successfully.");
        } else {
            System.out.println("Key not found in the map.");
        }
    }
}
```



```

    }
    System.out.print("Enter the key to remove the element: ");
    String keyToRemove = scanner.nextLine();
    if (map.containsKey(keyToRemove)) {
        map.remove(keyToRemove);
        System.out.println("Element removed successfully.");
    } else {
        System.out.println("Key not found in the map.");
    }
    System.out.println("Final Map:");
    printMap(map);

    scanner.close();
}

private static void printMap(Map<String, Integer> map) {
    for (Map.Entry<String, Integer> entry : map.entrySet()) {
        System.out.println("Key: " + entry.getKey() + ", Value: " + entry.getValue());
    }
    System.out.println();
}
}

```

OUTPUT :

```

(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q17$ javac Q17.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q17$ java Q17
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 27/06/2023
Enter the number of elements to add:
3
Enter the elements (key-value pairs):
5
4
4
9
0
2
Initial Map:
Key: 0, Value: 2
Key: 4, Value: 9
Key: 5, Value: 4

Enter the key to change the value: 0
Enter the new value: 5
Value changed successfully.
Enter the key to remove the element: 5
Element removed successfully.
Final Map:
Key: 0, Value: 5
Key: 4, Value: 9

```

18. Program to Convert HashMap to TreeMap .**CODE :**

```
import java.util.HashMap;
import java.util.Map;
import java.util.Scanner;
import java.util.TreeMap;
public class Q18{
    public static void main(String[] args) {
        System.out.println("Name : Anna Jose");
        System.out.println("Register Number : SJC22MCA-2008");
        System.out.println("Course Name : Object Oriented Programming Lab");
        System.out.println("Course Code : 20MCA132");
        System.out.println("Date : 27/06/2023");
        Map<String, Integer> hashMap = new HashMap<>();
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the number of elements to add: ");
        int numElements = scanner.nextInt();
        scanner.nextLine();
        System.out.println("Enter the elements (key-value pairs):");
        for (int i = 0; i < numElements; i++) {
            String key = scanner.nextLine();
            int value = scanner.nextInt();
            scanner.nextLine();
            hashMap.put(key, value);
        }
        System.out.println("Initial HashMap:");
        printMap(hashMap);
        Map<String, Integer> treeMap = new TreeMap<>(hashMap);
        System.out.println("Final TreeMap:");
        printMap(treeMap);
        scanner.close();
    }
    private static void printMap(Map<String, Integer> map) {
        for (Map.Entry<String, Integer> entry : map.entrySet()) {
            System.out.println("Key: " + entry.getKey() + ", Value: " + entry.getValue());
        }
        System.out.println();
    }
}
```

```
}
```

OUTPUT:

```
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q18$ javac Q18.java
(base) sjcet@Z238-UL:~/anna08/S2/java/co4/cycle4/q18$ java Q18
Name : Anna Jose
Register Number : SJC22MCA-2008
Course Name : Object Oriented Programming Lab
Course Code : 20MCA132
Date : 27/06/2023
Enter the number of elements to add: 3
Enter the elements (key-value pairs):
1
2
3
4
9
7
Initial HashMap:
Key: 1, Value: 2
Key: 3, Value: 4
Key: 9, Value: 7

Final TreeMap:
Key: 1, Value: 2
Key: 3, Value: 4
Key: 9, Value: 7
```