

1.Design an application that contains Phone Contacts in vertical linear manner. Selected contact appears at the top of the list with a large italicized font and a blue background.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/Theme.MyApplication"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@android:color/holo_blue_light"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/txt_lab1"
        android:layout_width="361dp"
        android:layout_height="99dp"
        android:text="Select phone number to display here"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent">
```

```

        app:layout_constraintVertical_bias="0.077" />

<ListView
    android:id="@+id/list_lab1"
    android:layout_width="309dp"
    android:layout_height="390dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/txt_lab1"
    app:layout_constraintVertical_bias="0.155" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

MainActivity.java

```

package com.example.myapplication;

import androidx.appcompat.app.AppCompatActivity;

import android.graphics.Typeface;
import android.os.Bundle;
import android.view.View;
import android.widget.AdapterView;
import android.widget.AdapterView.OnItemClickListener;
import android.widget.ArrayAdapter;
import android.widget.ListView;
import android.widget.TextView;

public class MainActivity extends AppCompatActivity {
    ListView lv;
    TextView tv;
    String [] li;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        li=getResources().getStringArray(R.array.list_lab1_contact);
        lv=findViewById(R.id.list_lab1);
        tv=findViewById(R.id.txt_lab1);

        final ArrayAdapter<String>adapter = new
ArrayAdapter<String>(this,android.R.layout.simple_list_item_1,android.R.id.te
xt1,li);
        lv.setAdapter(adapter);

        lv.setOnItemClickListener(new AdapterView.OnItemClickListener() {
            @Override
            public void onItemClick(AdapterView<?> adapterView, View view,
int i, long l) {
                String value=adapter.getItem(i);
                tv.setText(value);
                tv.setTypeface(null, Typeface.ITALIC);
            }
        })
    }
}

```

```
        });  
    }  
}
```

strings.xml

```
<resources>  
    <string name="app_name">Vysh First lab Program</string>  
    <string name="phone">Selected phone contacts will display here</string>  
    <string-array name="list_lab1_contact">  
        <item>Dr.Prashant G K 9980933552</item>  
        <item>Brunda G 9980933552</item>  
        <item>Kirana 9980933552</item>  
        <item>Ullas Hatwar 9380163216</item>  
        <item>Varsha Shetty H N 7760061264</item>  
        <item>Nisarga Navaneeth 9980933552</item>  
        <item>SriVyshnavi 9036974509</item>  
    </string-array>  
</resources>
```

2. Create an application that uses Layout Managers and Event Listeners.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportRtl="true"
        android:theme="@style/Theme.Vysh_labpro2"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textview1"
        android:layout_width="199dp"
        android:layout_height="58dp"
        android:text="@string/Ev"
        android:textSize="24sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.281"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.125" />

    <TextView
        android:id="@+id/textview2"
```

```

        android:layout_width="157dp"
        android:layout_height="37dp"
        android:text="@string/Department"
        android:textSize="24sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.236"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.247" />

<TextView
    android:id="@+id/textview3"
    android:layout_width="142dp"
    android:layout_height="53dp"
    android:text="@string/Dept"
    android:textSize="24sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.223"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.365" />

<Spinner
    android:id="@+id/spinner"
    android:layout_width="255dp"
    android:layout_height="96dp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.384"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.541" />

<Button
    android:id="@+id/Button"
    android:layout_width="130dp"
    android:layout_height="95dp"
    android:text="@string/Button"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.334"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.772" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

MainActivity.java

```

package com.example.vysh_labpro2;

import androidx.appcompat.app.AppCompatActivity;

import android.annotation.SuppressLint;
import android.graphics.Typeface;

```

```

import android.os.Bundle;
import android.view.View;
import android.widget.AdapterView;
import android.widget.AdapterView.Adapter;
import android.widget.ArrayAdapter;
import android.widget.Button;
import android.widget.Spinner;
import android.widget.TextView;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {
    Spinner sl;
    Button btn_convert;
    TextView textview;
    String [] Dept;

    @SuppressWarnings("MissingInflatedId")
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        btn_convert=findViewById(R.id.Button);
        Dept=getResources().getStringArray(R.array.Department);
        sl=findViewById(R.id.spinner);
        ArrayAdapter<String> adapter=new ArrayAdapter<>(this,
android.R.layout.simple_dropdown_item_1line,Dept);
        sl.setAdapter(adapter);
        sl.setOnItemClickListener(new AdapterView.OnItemClickListener()
{
            @Override
            public void onItemClick(AdapterView<?> adapterView, View view,
int i, long l) {
                int index=adapterView.getSelectedItemPosition();
                if(index>0){
                    Toast.makeText(MainActivity.this,"you have
selected"+Dept[index],Toast.LENGTH_SHORT).show();
                }
            }

            @Override
            public void onNothingSelected(AdapterView<?> adapterView) {

            }
        });
        btn_convert.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                textview=findViewById(R.id.textview3);
                textview.setTypeface(null, Typeface.BOLD_ITALIC);
            }
        });
    }
}

```

strings.xml

```
<resources>
    <string name="app_name">vysh_labpro2</string>
    <string name="Ev">EventListener</string>
    <string name="Department">SIT MCA</string>
    <string name="Dept">Department</string>
    <string name="Button">convert to italic</string>
    <string name="spinner">select the department</string>
    <string-array name="Department">
        <item>select the department</item>
        <item>MCA</item>
        <item>MBA</item>
        <item>BE</item>
        <item>M.Tech</item>
    </string-array>
</resources>
```

3. Develop a standard calculator application to perform basic calculations like addition, subtraction, multiplication and division.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/Theme.Vysh_lab3"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/txt_disp"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Basic Caluclator"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.073" />
```



```

<TextView
    android:id="@+id/txt_first"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="FIRST NUMBER"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.085"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.165" />

<TextView
    android:id="@+id/txt_sec"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="SECOND NUMBER"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.033"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.252" />

<EditText
    android:id="@+id/txt_firstno"
    android:layout_width="193dp"
    android:layout_height="38dp"
    android:ems="10"
    android:hint="Enter first number"
    android:inputType="textPersonName"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.646"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.154"
    tools:ignore="TouchTargetSizeCheck" />

<EditText
    android:id="@+id/txt_secondno"
    android:layout_width="185dp"
    android:layout_height="42dp"
    android:ems="10"
    android:hint="Enter second number"
    android:inputType="textPersonName"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.623"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.226"
    tools:ignore="MissingConstraints,TouchTargetSizeCheck" />

<EditText
    android:id="@+id/txt_result"

```

```
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:ems="10"
android:hint="Result view"
android:inputType="textPersonName"
app:layout_constraintBottom_toBottomOf="parent"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintHorizontal_bias="0.398"
app:layout_constraintStart_toStartOf="parent"
app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.432"
tools:ignore="TouchTargetSizeCheck" />
```

```
<Button
    android:id="@+id/btn_add"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Addition"
    android:onClick="btn_add"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.052"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.601" />
```

```
<Button
    android:id="@+id/btn_sub"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Subtract"
    android:onClick="btn_sub"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.601" />
```

```
<Button
    android:id="@+id/btn_mul"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Multiply"
    android:onClick="btn_mul"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.949"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.601" />
```

```
<Button
    android:id="@+id/btn_div"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Division"
    android:onClick="btn_div"
```

```

        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.289"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.711" />

<Button
    android:id="@+id/btn_clr"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Clear"
    android:onClick="btn_clr"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.761"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.711" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

MainActivity.java

```

package com.example.vysh_lab3;

import androidx.appcompat.app.AppCompatActivity;

import android.annotation.SuppressLint;
import android.os.Bundle;
import android.view.View;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
    @SuppressLint("Initializer")
    public void btn_add(View v)
    {
        float num1;float num2;float sum;
        EditText t1=findViewById(R.id.txt_firstno);
        EditText t2=findViewById(R.id.txt_secondno);
        TextView t3=findViewById(R.id.txt_result);
        t3.setText("Result");
        if (t1.length()==0||t2.length()==0)
            Toast.makeText(this, "Enter the values for numbered or number
only", Toast.LENGTH_SHORT).show();
        else
        {
            try
            {

```

```

        num1=Float.parseFloat(t1.getText().toString());
        num2=Float.parseFloat(t2.getText().toString());
        sum=num1+num2;
        t3.setText("Result"+Float.toString(sum));
    }
    catch(NumberFormatException e)
    {
        Toast toast= Toast.makeText(this, "Enter number only",
Toast.LENGTH_SHORT);
        toast.show();
    }
}

@SuppressLint("Initializer")
public void btn_sub(View v)
{
    float num1;float num2;float sub;
    EditText t1=findViewById(R.id.txt_firstno);
    EditText t2=findViewById(R.id.txt_secondno);
    TextView t3=findViewById(R.id.txt_result);
    t3.setText("Result");
    if(t1.length()==0||t2.length()==0)
        Toast.makeText(this, "Enter the values for numbered or number
only", Toast.LENGTH_SHORT).show();
    else
    {
        try
        {
            num1=Float.parseFloat(t1.getText().toString());
            num2=Float.parseFloat(t2.getText().toString());
            sub=num1-num2;
            t3.setText("Result"+Float.toString(sub));
        }
        catch(NumberFormatException e)
        {
            Toast toast= Toast.makeText(this, "Enter number only",
Toast.LENGTH_SHORT);
            toast.show();
        }
    }
}

@SuppressLint("Initializer")
public void btn_mul(View v)
{
    float num1;float num2;float mul;
    EditText t1=findViewById(R.id.txt_firstno);
    EditText t2=findViewById(R.id.txt_secondno);
    TextView t3=findViewById(R.id.txt_result);
    t3.setText("Result");
    if(t1.length()==0||t2.length()==0)
        Toast.makeText(this, "Enter the values for numbered or number
only", Toast.LENGTH_SHORT).show();
    else
    {
        try

```

```

        {
            num1=Float.parseFloat(t1.getText().toString());
            num2=Float.parseFloat(t2.getText().toString());
            mul=num1*num2;
            t3.setText("Result"+Float.toString(mul));
        }
        catch(NumberFormatException e)
        {
            Toast toast= Toast.makeText(this, "Enter number only",
Toast.LENGTH_SHORT);
            toast.show();
        }
    }
}
@SuppressLint("Initializer")
public void btn_div(View v)
{
    float num1;float num2;float div;
    EditText t1=findViewById(R.id.txt_firstno);
    EditText t2=findViewById(R.id.txt_secondno);
    TextView t3=findViewById(R.id.txt_result);
    t3.setText("Result");
    if(t1.length()==0||t2.length()==0)
        Toast.makeText(this, "Enter the values for numbered or number
only", Toast.LENGTH_SHORT).show();
    else
    {
        try
        {
            num1=Float.parseFloat(t1.getText().toString());
            num2=Float.parseFloat(t2.getText().toString());
            if(num2!=0)
            {
                div=num1/num2;
                t3.setText("Result:"+Float.toString(div));
            }
            else {
                Toast toast=Toast.makeText(this, "", Toast.LENGTH_SHORT);
                toast.show();
            }
        }
        catch(NumberFormatException e)
        {
            Toast toast= Toast.makeText(this, "Enter number only",
Toast.LENGTH_SHORT);
            toast.show();
        }
    }
}
public void btn_clr(View v)
{
    Float num1,num2,num3;
    EditText t1=findViewById(R.id.txt_firstno);
    EditText t2=findViewById(R.id.txt_secondno);
    TextView t3=findViewById(R.id.txt_result);

```

```
        t1.setText(0);  
        t2.setText("");  
        t3.setText("Result");  
    }  
}
```

strings.xml

```
<resources>  
    <string name="app_name">vysh_lab3</string>  
</resources>
```

4. Devise an application that draws basic graphical primitives (rectangle, circle) on the screen.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/Theme.Vysh_lab4"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <ImageView
        android:id="@+id/imgview"
        android:layout_width="307dp"
        android:layout_height="194dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.496"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.16"
        app:srcCompat="@drawable/ic_launcher_foreground"
        tools:ignore="ContentDescription,ImageContrastCheck" />

    <Button
```

```
android:id="@+id/exit"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:text="EXIT"
app:layout_constraintBottom_toBottomOf="parent"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintHorizontal_bias="0.835"
app:layout_constraintStart_toStartOf="parent"
app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.792"
tools:ignore="HardcodedText" />
```

```
<Button
    android:id="@+id/rect"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:onClick="draw_ro"
    android:text="RECT"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.129"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.527"
    tools:ignore="HardcodedText" />
```

```
<Button
    android:id="@+id/line"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:onClick="draw_ro"
    android:text="LINE"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.129"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.66"
    tools:ignore="HardcodedText" />
```

```
<Button
    android:id="@+id/sqrc"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:onClick="draw_ro"
    android:text="SQUARE"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.835"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.648"
    tools:ignore="HardcodedText" />
```

```
<Button
    android:id="@+id/clr"
    android:layout_width="wrap_content"
```



```

        android:layout_height="wrap_content"
        android:onClick="draw_ro"
        android:text="CLEAR"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.129"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.792"
        tools:ignore="HardcodedText" />

<Button
    android:id="@+id/circ"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="52dp"
    android:onClick="draw_ro"
    android:text="CIRCLE"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.527"
    tools:ignore="HardcodedText" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

MainActivity.java

```

package com.example.vysh_lab4;

import androidx.appcompat.app.AppCompatActivity;

import android.graphics.Bitmap;
import android.graphics.Canvas;
import android.graphics.Color;
import android.graphics.Paint;
import android.graphics.Rect;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.ImageView;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {
    ImageView iv;
    Button rect,circ,line,sqrc,clr,exit;
    Bitmap bitmap;
    Canvas canvas;
    Paint paint;
    int sp=55;
    Rect recta;
    int CanvasRadius,CanvasPadding=7,height,width;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}

```

```

        iv=findViewById(R.id.imgview);
        rect=findViewById(R.id.rect);
        circ=findViewById(R.id.circ);
        line=findViewById(R.id.line);
        sqrc=findViewById(R.id.sqrc);
        clr=findViewById(R.id.clr);
        exit=findViewById(R.id.exit);
    }
    public void draw_ro(View view)
    {
        bitmap=Bitmap.createBitmap(400,250,Bitmap.Config.RGB_565);
        canvas=new Canvas(bitmap);
        canvas.drawColor(Color.CYAN);
        paint=new Paint();
        paint.setStyle(Paint.Style.FILL_AND_STROKE);
        paint.setColor(Color.BLUE);
        paint.setAntiAlias(true);

        if(view==rect)
        {
            recta=new Rect(55,55,350,200);
            canvas.drawRect(recta,paint);
            iv.setImageBitmap(bitmap);
            Toast.makeText(this, "Rectangle Drawn",
Toast.LENGTH_SHORT).show();
        }

        if(view==circ)
        {
            CanvasRadius=Math.min(canvas.getWidth(), canvas.getHeight()/2);
            canvas.drawCircle(canvas.getWidth()/2,
canvas.getHeight()/2,CanvasRadius-CanvasPadding,paint);
            iv.setImageBitmap(bitmap);
            Toast.makeText(this, "Circle is drawn",
Toast.LENGTH_SHORT).show();
        }

        if(view==line)
        {
            canvas.drawLine(200,55,200,300,paint);
            iv.setImageBitmap(bitmap);
            Toast.makeText(this, "Straight line is drawn",
Toast.LENGTH_SHORT).show();
        }

        if(view == sqrc)
        {
            recta=new Rect(55,55,200,200);
            canvas.drawRect(recta,paint);
            iv.setImageBitmap(bitmap);
            Toast.makeText(this, "Square is drawn",
Toast.LENGTH_SHORT).show();
        }

        if(view==clr)
        {
            iv.setImageDrawable(null);

```

```
        }  
        if (view==exit)  
        {  
            finish();  
        }  
    }  
}
```

strings.xml

```
<resources>  
    <string name="app_name">vysh_lab4</string>  
</resources>
```

5. Build a mobile application that create, save, update and delete data in a SQL lite /cloud database connectivity.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/Theme.Vysh_lab51"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/tv"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/txt_name"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/txt_name"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.113"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.08" />
```

```

<TextView
    android:id="@+id/txt_id"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="@string/txt_id"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.113"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.195" />

<TextView
    android:id="@+id/txt_sur"
    android:layout_width="89dp"
    android:layout_height="34dp"
    android:hint="Enter your Surname"
    android:text="@string/txt_sur"
    android:textSize="20sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.113"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.308"
    tools:ignore="HardcodedText,TextSizeCheck" />

<EditText
    android:id="@+id/edit_name"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:hint="Enter your name"
    android:inputType="textPersonName"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.8"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.064"
    tools:ignore="Autofill,HardcodedText,TouchTargetSizeCheck" />

<EditText
    android:id="@+id/edit_id"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:hint="Enter your ID"
    android:inputType="textPersonName"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.805"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.176"

```

```

        tools:ignore="Autofill,HardcodedText,TouchTargetSizeCheck" />

<EditText
    android:id="@+id/edit_sur"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:hint="Enter your Surname"
    android:inputType="textPersonName"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.81"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.306"
    tools:ignore="Autofill,HardcodedText,TouchTargetSizeCheck" />

<Button
    android:id="@+id/btn_add"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="ADD"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.126"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.499"
    tools:ignore="HardcodedText" />

<Button
    android:id="@+id/btn_upd"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="UPDATE"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.88"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.499"
    tools:ignore="HardcodedText" />

<Button
    android:id="@+id/btn_del"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="DELETE"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.126"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.65"
    tools:ignore="HardcodedText" />

<Button

```

```

        android:id="@+id/btn_view"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="VIEW ALL"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.88"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.65"
        tools:ignore="HardcodedText" />

<Button
    android:id="@+id/btn_clear"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="CLEAR"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.467"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.579"
    tools:ignore="HardcodedText" />

<TextView
    android:id="@+id/tv_show"
    android:layout_width="325dp"
    android:layout_height="165dp"
    android:text="result view"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.472"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.922"
    tools:ignore="HardcodedText" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

MainActivity.java

```

package com.example.vysh_lab51;

import androidx.appcompat.app.AppCompatActivity;

import android.annotation.SuppressLint;
import android.database.Cursor;
import android.database.sqlite.SQLiteDatabase;
import android.os.Bundle;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {

```

```

DataBaseHelper mydb;
EditText edit_name,edit_id,edit_sur;
TextView tv_show;
Button btn_add,btn_upd,btn_del,btn_view,btn_clr;
@SuppressLint("MissingInflatedId")

@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);

    mydb = new DataBaseHelper(this) ;
    edit_name = findViewById(R.id.edit_name);
    edit_id = findViewById(R.id.edit_id);
    edit_sur = findViewById(R.id.edit_sur);
    btn_add = findViewById(R.id.btn_add);
    btn_upd = findViewById(R.id.btn_upd);
    btn_del = findViewById(R.id.btn_del);
    btn_view = findViewById(R.id.btn_view);
    btn_clr = findViewById(R.id.btn_clear);
    tv_show = findViewById(R.id.tv_show);

    AddData();
    viewAllData();
    UpdateData();
    DeleteData();
    ClearData();
}
private void ClearData()
{
    btn_clr.setOnClickListener((view->
    {
        edit_name.setText("");
        edit_id.setText("");
        edit_sur.setText("");
    }));
}
public void viewAllData()
{
    btn_view.setOnClickListener((view->
    {
        Cursor res= mydb.getAllData();
        if(res.getCount()==0)
            Toast.makeText(this, "No Data", Toast.LENGTH_SHORT).show();
        else
        {
            StringBuffer buffer=new StringBuffer();
            while(res.moveToNext())
            {
                buffer.append("Name:"+res.getString(0)+"\t");
                buffer.append("ID:"+res.getString(1)+"\t");
                buffer.append("Surname:"+res.getString(2)+"\t");
                buffer.append("\n");
            }
            tv_show.setText("Data from Database \n"+buffer.toString());
        }
    }
}

```



```

        }));
    }
    public void UpdateData()
    {
        btn_upd.setOnClickListener((view->
        {
            boolean
ud=mydb.updateData(edit_name.getText().toString(),edit_id.getText().toString(
),edit_sur.getText().toString());
            if(ud==true)
                Toast.makeText(this, "Record updated",
Toast.LENGTH_SHORT).show();
            else
                Toast.makeText(this, "Record not updated",
Toast.LENGTH_SHORT).show();
        }));
    }
    public void AddData()
    {
        btn_add.setOnClickListener((view->
        {
            boolean
isinserted=mydb.insertData(edit_name.getText().toString(),edit_id.getText().t
oString(),edit_sur.getText().toString());
            if(isinserted==true)
                Toast.makeText(this, "Record is not inserted",
Toast.LENGTH_SHORT).show();
            else
                Toast.makeText(this, "Record is inserted",
Toast.LENGTH_SHORT).show();
        }));
    }
    public void DeleteData()
    {
        btn_del.setOnClickListener((view->
        {
            Integer dr=mydb.DeleteData(edit_id.getText().toString());
            if(dr>0)
                Toast.makeText(this, "Record is deleted",
Toast.LENGTH_SHORT).show();
            else
                Toast.makeText(this, "Record is not deleted",
Toast.LENGTH_SHORT).show();
        }));
    }
}

```

DataBaseHelper.java

```

package com.example.vysh_lab51;

import android.content.ContentValues;
import android.content.Context;
import android.database.Cursor;
import android.database.sqlite.SQLiteDatabase;
import android.database.sqlite.SQLiteOpenHelper;

```

```

import androidx.annotation.Nullable;

public class DataBaseHelper extends SQLiteOpenHelper {

    public static final String database_name = "student.db";
    public static final String Table_name = "student_table", col_1 = "Name",
col_2 = "ID", col_3 = "Surname";

    public DataBaseHelper(@Nullable Context context) {
        super(context, database_name, null, 1);
    }

    @Override
    public void onCreate(SQLiteDatabase db) {
        String query = ("create table " + Table_name + " (Name Text, ID
integer primary key, Surname Text)");
        db.execSQL(query);
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int i, int i1) {
        db.execSQL("Drop table if Exists " + Table_name);
        onCreate(db);
    }

    public boolean insertData(String Name, String ID, String Surname) {
        SQLiteDatabase db = this.getWritableDatabase();
        ContentValues contentValues = new ContentValues();
        if (Name.length() == 0 || ID.length() == 0 | Surname.length() == 0) {
            return false;
        } else {
            contentValues.put(col_1, Name);
            contentValues.put(col_2, ID);
            contentValues.put(col_3, Surname);
            long result = db.insert(Table_name, null, contentValues);
            if (result == 1)
                return true;
            else
                return false;
        }
    }

    public Cursor getAllData() {
        SQLiteDatabase db = this.getWritableDatabase();
        Cursor res = db.rawQuery("select * from " + Table_name, null);
        return res;
    }

    public boolean updateData(String Name, String ID, String Surname) {
        int i;
        SQLiteDatabase db = this.getWritableDatabase();
        ContentValues contentValues = new ContentValues();

```

```

        if (Name.length() == 0 || ID.length() == 0 || Surname.length() == 0) {
            return false;
        } else {
            contentValues.put(col_1, Name);
            contentValues.put(col_2, ID);
            contentValues.put(col_3, Surname);
            i = db.update(Table_name, contentValues, "ID=?", new
String[]{ID});
            if (i > 0)
                return true;
            else
                return false;
        }

    }

    public Integer DeleteData(String ID) {
        SQLiteDatabase db = this.getWritableDatabase();
        return db.delete(Table_name, "ID=?", new String[]{ID});
    }
}

```

strings.xml

```

<resources>
    <string name="app_name">vysh_lab51</string>
    <string name="txt_name">Name</string>
    <string name="txt_id">ID</string>
    <string name="txt_sur">Surname</string>
</resources>

```

6. Devise an application that implements Multi-Threading.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/Theme.Vysh_lab6"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Displaying Images"
        android:textSize="16sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.105" />

    <ImageView
        android:id="@+id/imageView"
```

```

        android:layout_width="325dp"
        android:layout_height="225dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.243"
        tools:srcCompat="@tools:sample/backgrounds/scenic" />

<Button
    android:id="@+id/button"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Button 1"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.592" />

<Button
    android:id="@+id/button2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Button 2"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.699" />
</androidx.constraintlayout.widget.ConstraintLayout>

```

MainActivity.java

```

package com.example.vysh_lab6;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.ImageView;

public class MainActivity extends AppCompatActivity {

    ImageView img;
    Button btn1, btn2;
    int count=0;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        btn1=(Button) findViewById(R.id.button);
    }
}

```

```

btn2=(Button)findViewById(R.id.button2);
img=(ImageView)findViewById(R.id.imageView);

btn1.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        new Thread(new Runnable() {
            @Override
            public void run() {
                img.post(new Runnable() {
                    @Override
                    public void run() {
                        if(count==0)
                        {
                            img.setImageResource(R.drawable.india1);
                            count=count+1;
                        }
                        else
                        {
                            img.setImageResource(R.drawable.karnataka);
                        }
                    }
                });
            }
        }).start();
    }
});
btn2.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View view) {
        new Thread(new Runnable() {
            @Override
            public void run() {
                img.post(new Runnable() {
                    @Override
                    public void run() {
                        img.setImageResource(R.drawable.nature);
                    }
                });
            }
        }).start();
    }
});
}
}

```

strings.xml

```

<resources>
    <string name="app_name">vysh_lab6</string>
</resources>

```

7. Develop a mobile application that displays the Google maps and different view in maps.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <uses-permission android:name="android.permission.INTERNET"></uses-
permission>
    <uses-permission
android:name="android.permission.ACCESS_FINE_LOCATION"></uses-permission>
    <uses-permission
android:name="android.permission.ACCESS_COARSE_LOCATION"></uses-permission>

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/Theme.Vysh_lab7"
        tools:targetApi="31">

        <!--
            TODO: Before you run your application, you need a Google Maps
API key.

            To get one, follow the directions here:

                https://developers.google.com/maps/documentation/android-
sdk/get-api-key

            Once you have your API key (it starts with "AIza"), define a new
property in your
            project's local.properties file (e.g. MAPS_API_KEY=Aiza...), and
replace the
                "YOUR_API_KEY" string in this file with "${MAPS_API_KEY}".
-->
        <meta-data
            android:name="com.google.android.geo.API_KEY"
            android:value="AIzaSyAeZgfhV34kG8cBfC2hsmI218V5IH-5hOI" />

        <activity
            android:name=".MapsActivity"
            android:exported="true"
            android:label="@string/title_activity_maps">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>
```

```
</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<fragment xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:map="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/map"
    android:name="com.google.android.gms.maps.SupportMapFragment"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MapsActivity" />
```

MainActivity.java

```
package com.example.vysh_lab7;

import androidx.fragment.app.FragmentActivity;

import android.os.Bundle;

import com.google.android.gms.maps.CameraUpdateFactory;
import com.google.android.gms.maps.GoogleMap;
import com.google.android.gms.maps.OnMapReadyCallback;
import com.google.android.gms.maps.SupportMapFragment;
import com.google.android.gms.maps.model.LatLng;
import com.google.android.gms.maps.model.MarkerOptions;
import com.example.vysh_lab7.databinding.ActivityMapsBinding;

public class MapsActivity extends FragmentActivity implements
    OnMapReadyCallback {

    private GoogleMap mMap;
    private ActivityMapsBinding binding;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);

        binding = ActivityMapsBinding.inflate(getLayoutInflater());
        setContentView(binding.getRoot());

        // Obtain the SupportMapFragment and get notified when the map is
        // ready to be used.
        SupportMapFragment mapFragment = (SupportMapFragment)
            getSupportFragmentManager()
                .findFragmentById(R.id.map);
        mapFragment.getMapAsync(this);
    }

    /**
     * Manipulates the map once available.
     * This callback is triggered when the map is ready to be used.
     * This is where we can add markers or lines, add listeners or move the
     * camera. In this case,
```



```

        * we just add a marker near Sydney, Australia.
        * If Google Play services is not installed on the device, the user will
be prompted to install
        * it inside the SupportMapFragment. This method will only be triggered
once the user has
        * installed Google Play services and returned to the app.
        */
@Override
public void onMapReady(GoogleMap googleMap) {
    mMap = googleMap;

    // Add a marker in Sydney and move the camera
    LatLng SIT = new LatLng(13.327115541272573, 77.12609829346015);
    mMap.addMarker(new MarkerOptions().position(SIT).title("Marker in
SIT"));
    mMap.moveCamera(CameraUpdateFactory.newLatLng(SIT));
}
}

```

Strings.xml

```

<resources>
    <string name="app_name">vysh_lab7</string>
    <string name="title_activity_maps">MapsActivity</string>
</resources>

```

8. Create application that write data to the SD card.

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <uses-permission
android:name="android.permission.WRITE_EXTERNAL_STORAGE"></uses-permission>
    <uses-permission
android:name="android.permission.READ_EXTERNAL_STORAGE"></uses-permission>

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/Theme.Vysh_lab8"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Reading and Writing to External Storage"
        android:textSize="20sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
    >
```

```

        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.125" />

<EditText
    android:id="@+id/edit_text"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:gravity="start|top"
    android:inputType="textMultiLine"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.497"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.23"
    tools:ignore="SpeakableTextPresentCheck,TouchTargetSizeCheck" />

<LinearLayout
    android:id="@+id/linearLayout"
    android:layout_width="172dp"
    android:layout_height="48dp"
    android:orientation="horizontal"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent">

    <Button
        android:id="@+id/button2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="SAVE" />

    <Button
        android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="READ" />

</LinearLayout>

<TextView
    android:id="@+id/textView2"
    android:layout_width="287dp"
    android:layout_height="173dp"
    android:text="TextView"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.83" />

</androidx.constraintlayout.widget.ConstraintLayout>

```

MainActivity.java

```
package com.example.vysh_lab8;

import androidx.appcompat.app.AppCompatActivity;

import android.annotation.SuppressLint;
import android.content.SharedPreferences;
import android.os.Bundle;
import android.os.Environment;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

import java.io.BufferedReader;
import java.io.DataInputStream;
import java.io.File;
import java.io.FileInputStream;
import java.io.FileOutputStream;
import java.io.FileReader;
import java.io.FileWriter;
import java.io.IOException;
import java.io.InputStreamReader;

public class MainActivity extends AppCompatActivity {
    EditText inputText;
    TextView response;
    Button saveButton, readButton;

    private String filename = "SampleFile.txt";
    private String filepath = "MyFileStorage";
    File myExternalFile;
    String myData = "";

    @SuppressWarnings("MissingInflatedId")
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        inputText = (EditText) findViewById(R.id.edit_text);
        response = (TextView) findViewById(R.id.textView2);

        saveButton = (Button) findViewById(R.id.button2);

        saveButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                try {
                    FileOutputStream fos = new
FileOutputStream(myExternalFile);
                    fos.write(inputText.getText().toString().getBytes());
```

```

        fos.close();
    } catch (IOException e) {
        e.printStackTrace();
    }
    inputText.setText("");
    inputText.setFocusable(true);
    response.setText("SampleFile.txt saved to External
Storage...");
}
});

readButton = (Button) findViewById(R.id.button);

readButton.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        try {
            FileInputStream fis = new
FileInputStream(myExternalFile);
            DataInputStream in = new DataInputStream(fis);
            BufferedReader br =
                new BufferedReader(new InputStreamReader(in));
            String strLine;
            while ((strLine = br.readLine()) != null) {
                myData = myData + strLine;
            }
            in.close();
        } catch (IOException e) {
            e.printStackTrace();
        }
        inputText.setText(myData);
        response.setText("SampleFile.txt data retrieved from Internal
Storage...");
    }
});

if (!isExternalStorageAvailable() || isExternalStorageReadOnly()) {
    saveButton.setEnabled(false);
}
else {
    myExternalFile = new File(getExternalFilesDir(filepath),
filename);
}

}
private static boolean isExternalStorageReadOnly() {
    String extStorageState = Environment.getExternalStorageState();
    if (Environment.MEDIA_MOUNTED_READ_ONLY.equals(extStorageState)) {
        return true;
    }
    return false;
}

private static boolean isExternalStorageAvailable() {

```

```
        String extStorageState = Environment.getExternalStorageState();
        if (Environment.MEDIA_MOUNTED.equals(extStorageState)) {
            return true;
        }
        return false;
    }
}
```

Strings.xml

```
<resources>
    <string name="app_name">vysh_lab8</string>
</resources>
```