MOBILE APPLICATION DEVELOPMENT (18CSMP68)

1. Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the centre. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number.

activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout 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/textView5"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="95dp"
        android:layout_marginBottom="183dp"
        android:text="@string/darshanraj046_gmail_com"
        android:textAlignment="center"
        android:textColor="@color/black"
        android:textSize="18sp"
        android:textStyle="bold" />

    <TextView
        android:id="@+id/textView4"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="57dp"
        android:layout_marginBottom="234dp"
        android:text="@string/_109_brindavan_extension_mysore"
        android:textAlignment="center"
        android:textColor="@color/black"
        android:textSize="18sp"
        android:textStyle="bold" />

    <TextView
        android:id="@+id/textView3"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
```

```xml
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="130dp"
        android:layout_marginBottom="282dp"
        android:text="@string/_91_90363_310656"
        android:textAlignment="center"
        android:textColor="@color/black"
        android:textSize="18sp"
        android:textStyle="bold" />

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="88dp"
        android:layout_marginBottom="440dp"
        android:text="@string/maharaja_institute_of_technology_mysore"
        android:textAlignment="center"
        android:textAllCaps="true"
        android:textColor="#000000"
        android:textSize="20sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <ImageView
        android:id="@+id/imageView"
        android:layout_width="89dp"
        android:layout_height="81dp"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="21dp"
        android:layout_marginBottom="427dp"
        android:contentDescription="@string/logo"
        app:srcCompat="@drawable/mitlogo" />

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="165dp"
        android:layout_marginBottom="367dp"
        android:text="@string/darshan_r"
        android:textAlignment="center"
        android:textColor="@color/black"
        android:textSize="18sp"
        android:textStyle="bold" />
```

```xml
    <TextView
        android:id="@+id/textView2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="177dp"
        android:layout_marginBottom="327dp"
        android:text="@string/student"
        android:textAlignment="center"
        android:textColor="@color/black"
        android:textSize="18sp"
        android:textStyle="italic" />

    <View
        android:id="@+id/divider4"
        android:layout_width="match_parent"
        android:layout_height="8sp"
        android:layout_alignParentBottom="true"
        android:layout_marginBottom="414dp"
        android:background="@color/black" />

</RelativeLayout>
```

MainActivity.java

```java
package com.visitingcardapp;

import androidx.appcompat.app.AppCompatActivity;
import android.os.Bundle;

public class MainActivity extends AppCompatActivity {

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

2. Develop an Android application using controls like Button, TextView, EditText for designing a calculator having basic functionality like Addition, Subtraction, Multiplication, and Division.

activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
  xmlns:tools="http://schemas.android.com/tools"
  android:layout_width="match_parent"
  android:layout_height="match_parent"
  android:orientation="vertical"
  tools:context=".MainActivity">

  <LinearLayout
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:layout_marginTop="700px">

  <EditText
      android:id="@+id/editText"
      android:layout_width="0dp"
      android:layout_height="fill_parent"
      android:layout_marginBottom="1pt"
      android:layout_weight="1"
      android:ems="10"
      android:gravity="right|center"
      android:inputType="textPersonName"
      android:text="0"
      android:textSize="50sp"
      android:textStyle="bold" />

  </LinearLayout>
  <TableLayout
      android:layout_width="match_parent"
      android:layout_height="wrap_content">
      <TableRow
        android:layout_marginBottom="1pt"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="vertical"
        android:layout_marginHorizontal="10dp">

        <Button
          android:id="@+id/butPlus"
          android:layout_width="30pt"
          android:layout_height="30pt"
          android:layout_marginEnd="1pt"
          android:layout_weight="1"
          android:text="+"
          android:onClick="operatorEvent" />

        <Button
```

```
      android:id="@+id/butMinus"
      android:layout_width="30pt"
      android:layout_height="30pt"
      android:layout_marginEnd="1pt"
      android:layout_weight="1"
      android:text="-"
      android:onClick="operatorEvent" />

   <Button
      android:id="@+id/butDivide"
      android:layout_width="30pt"
      android:layout_height="30pt"
      android:layout_marginEnd="1pt"
      android:layout_weight="1"
      android:text="/"
      android:onClick="operatorEvent" />

   <Button
      android:id="@+id/butMultiply"
      android:layout_width="30pt"
      android:layout_height="30pt"
      android:layout_marginEnd="1pt"
      android:layout_weight="1"
      android:text="*"
      android:onClick="operatorEvent" />

 </TableRow>

 <TableRow
    android:layout_marginBottom="1pt"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:layout_marginHorizontal="10px">

    <Button
       android:id="@+id/butEqual"
       android:layout_width="30pt"
       android:layout_height="30pt"
       android:layout_marginEnd="1pt"
       android:layout_weight="1"
       android:text="="
       android:onClick="equalEvent" />

 </TableRow>
  </TableLayout>
</LinearLayout>
```

```java
package com.calculatorapp;
import androidx.appcompat.app.AppCompatActivity;
import android.os.Bundle;
import android.view.View;
import android.widget.EditText;
public class MainActivity extends AppCompatActivity {
  boolean isEmpty = true;
  String numOld = "";
  String op = "+";
  EditText edt;
  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    edt = findViewById(R.id.editText);
  }
  public void operatorEvent(View view) {
    numOld = edt.getText().toString();
    isEmpty = true;
    if(isEmpty)
      edt.setText("");
    isEmpty = false;
    switch (view.getId()){
      case R.id.butDivide:op = "/"; break;
      case R.id.butMultiply:op = "*"; break;
      case R.id.butPlus:op = "+"; break;
      case R.id.butMinus:op = "-"; break;
    }
  }
  public void equalEvent(View view) {
    String numNew = edt.getText().toString();
    double result = 0.0;
    switch (op){
      case "+":
        result=Double.parseDouble(numOld)+Double.parseDouble(numNew);
        break;
      case "-":
        result=Double.parseDouble(numOld)-
            Double.parseDouble(numNew);
        break;
      case "*":
        result=Double.parseDouble(numOld)*Double.parseDouble(numNew);
        break;
      case "/":
        result=Double.parseDouble(numOld)/Double.parseDouble(numNew);
        break;
      default:
        throw new IllegalStateException("Unexpected value: " + op);
    }
    edt.setText(result+"");
  }
```

}

3. Create a SIGN Up activity with Username and Password. Validation of password should happen based on the following rules:

- Passwords should contain uppercase and lowercase letters.
- Passwords should contain letters and numbers.
- Passwords should contain special characters.
- Minimum length of the password (the default value is 8).

On successful SIGN UP proceed to the next Login activity. Here the user should SIGN IN using the Username and Password created during signup activity. If the Username and Password are matched then navigate to the next activity which displays a message saying "Successful Login" or else display a toast message saying "Login Failed".The user is given only two attempts and after that display a toast message saying "Failed Login Attempts" and disable the SIGN IN button. Use Bundle to transfer information from one activity to another.

activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout 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">

  <EditText
    android:id="@+id/txt_password"
    android:layout_width="265dp"
    android:layout_height="61dp"
    android:layout_alignParentEnd="true"
    android:layout_alignParentBottom="true"
    android:layout_marginEnd="74dp"
    android:layout_marginBottom="301dp"
    android:ems="10"
    android:hint="@string/password"
    android:inputType="textPassword" />

  <TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignParentEnd="true"
    android:layout_alignParentBottom="true"
    android:layout_marginEnd="142dp"
    android:layout_marginBottom="494dp"
    android:text="@string/sign_up"
    android:textAlignment="center"
```

```xml
        android:textAllCaps="true"
        android:textColor="#21A7E4"
        android:textSize="34sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/txt_username"
        android:layout_width="265dp"
        android:layout_height="61dp"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="74dp"
        android:layout_marginBottom="386dp"
        android:ems="10"
        android:hint="@string/email_username"
        android:inputType="textEmailAddress" />

    <Button
        android:id="@+id/btn_signup"
        android:layout_width="150dp"
        android:layout_height="59dp"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="131dp"
        android:layout_marginBottom="212dp"
        android:textSize="20sp"
        android:text="@string/sign_up"
        android:onClick="SignUpEvent"
        />

</RelativeLayout>
```

MainActivity.java

```java
package com.loginsignupapp;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

import java.util.regex.Pattern;
```

```java
public class MainActivity extends AppCompatActivity {
  EditText username, password;
  Button btn;
  int counter = 3;

  Pattern lowercase = Pattern.compile("^.*[a-z].*$");
  Pattern uppercase = Pattern.compile("^.*[A-Z].*$");
  Pattern numbers = Pattern.compile("^.*[0-9].*$");
  Pattern specialChar = Pattern.compile("^.*[^a-zA-Z0-9].*$");

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

    username = findViewById(R.id.txt_username);
    password = findViewById(R.id.txt_password);
  }

  public void SignUpEvent(View view) {
    String uName = username.getText().toString();
    String pwd = password.getText().toString();

    if (isValidPassword(pwd)){
      Toast.makeText(MainActivity.this, "Invalid Password", Toast.LENGTH_LONG).show();
      return;
    }
    Intent it = new Intent(MainActivity.this, LoginActivity.class);
    it.putExtra("userName", uName);
    it.putExtra("pwd", pwd);
    startActivity(it);
  }

  private boolean isValidPassword(String pwd) {
    if (pwd.length() < 8)
      return false;
    if (!lowercase.matcher(pwd).matches())
      return false;
    if (!uppercase.matcher(pwd).matches())
      return false;
    if (!numbers.matcher(pwd).matches())
      return false;
    if (!specialChar.matcher(pwd).matches())
      return false;
    return true;
  }
}
```

activity_login.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout 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=".LoginActivity">

    <EditText
        android:id="@+id/login_password"
        android:layout_width="265dp"
        android:layout_height="61dp"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="74dp"
        android:layout_marginBottom="301dp"
        android:ems="10"
        android:hint="@string/password"
        android:inputType="textPassword" />

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="158dp"
        android:layout_marginBottom="494dp"
        android:text="@string/login"
        android:textAlignment="center"
        android:textAllCaps="true"
        android:textColor="#FF5722"
        android:textSize="34sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/login_username"
        android:layout_width="265dp"
        android:layout_height="61dp"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="74dp"
        android:layout_marginBottom="386dp"
        android:ems="10"
        android:hint="@string/email_username"
        android:inputType="textEmailAddress" />

    <Button
```

```xml
        android:id="@+id/btn_login"
        android:layout_width="150dp"
        android:layout_height="59dp"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="131dp"
        android:layout_marginBottom="212dp"
        android:text="@string/login"
        android:textSize="20sp"
        android:onClick="LoginEvent"
        />

</RelativeLayout>
```

LoginActivity.java

```java
package com.loginsignupapp;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

public class LoginActivity extends AppCompatActivity {

  EditText userName, password;
  Button btn;
  int counter = 3;

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

    userName = findViewById(R.id.login_username);
    password = findViewById(R.id.login_password);
    btn = findViewById(R.id.btn_login);
  }

  public void LoginEvent(View view) {
    String uName = userName.getText().toString();
    String pwd = password.getText().toString();
    String regUserName = getIntent().getStringExtra("userName");
    String regPwd = getIntent().getStringExtra("pwd");
    if (regUserName.equals(uName) && regPwd.equals(pwd)){
      Intent it = new Intent(LoginActivity.this, LoginSuccessful.class);
      startActivity(it);
```

```java
        } else {
            Toast.makeText(LoginActivity.this, "Invalid Credentials", Toast.LENGTH_SHORT).show();
            counter--;
        }
        if (counter == 0) {
            Toast.makeText(getBaseContext(), "Failed Login Attempts", Toast.LENGTH_SHORT).show();
            btn.setEnabled(false);
        }
    }
}
```

activity_login_successful.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout 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:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="49dp"
        android:layout_marginBottom="338dp"
        android:text="@string/login_successful"
        android:textAlignment="center"
        android:textAllCaps="true"
        android:textColor="#03A9F4"
        android:textSize="34sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

</RelativeLayout>
```

LoginSuccessful.java

```java
package com.loginsignupapp;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;

public class LoginSuccessful extends AppCompatActivity {
```

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

4. Develop an application to set an image as wallpaper. On click of a button, the wallpaper image should start to change randomly every 30 seconds.

activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout 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:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="31dp"
        android:layout_marginBottom="385dp"
        android:text="@string/wallpaper_changer_app"
        android:textAlignment="center"
        android:textColor="@color/black"
        android:textSize="33sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="46dp"
        android:layout_marginBottom="249dp"
```

```xml
                android:text="@string/click_to_change_wallpaper"
                android:textSize="20sp"
                android:onClick="changeWallpaper"
                />

</RelativeLayout>
```

<div align="center">MainActivity.java</div>

```java
package com.wallpaperchangerapp;

import androidx.appcompat.app.AppCompatActivity;

import android.app.WallpaperManager;
import android.graphics.Bitmap;
import android.graphics.drawable.BitmapDrawable;
import android.graphics.drawable.Drawable;
import android.os.Bundle;
import android.view.View;

import java.io.IOException;
import java.util.Timer;
import java.util.TimerTask;

public class MainActivity extends AppCompatActivity {

  Timer myTime;
  Drawable drawable;
  WallpaperManager wpMan;
  int nextImg = 1;

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

    myTime = new Timer();
    wpMan = WallpaperManager.getInstance(this);
  }

  public void changeWallpaper(View view) {
    setWallpaper();
  }

  private void setWallpaper() {
    myTime.schedule(new TimerTask() {
      @Override
      public void run() {
        if (nextImg == 1){
```

```java
            drawable = getResources().getDrawable(R.drawable.img1);
            nextImg = 2;
        } else if (nextImg == 2){
            drawable = getResources().getDrawable(R.drawable.img2);
            nextImg = 3;
        } else if (nextImg == 3){
            drawable = getResources().getDrawable(R.drawable.img3);
            nextImg = 4;
        } else if (nextImg == 4){
            drawable = getResources().getDrawable(R.drawable.img4);
            nextImg = 5;
        } else if (nextImg == 5){
            drawable = getResources().getDrawable(R.drawable.img5);
            nextImg = 6;
        } else {
            drawable = getResources().getDrawable(R.drawable.img6);
            nextImg = 1;
        }
        Bitmap imgBmp = ((BitmapDrawable)drawable).getBitmap();
        try {
            wpMan.setBitmap(imgBmp);
        } catch (IOException e) {
            e.printStackTrace();
        }
        }
    }
    }, 30000, 2000);
 }
}
```

5. Write a program to create an activity with two buttons START and STOP. On pressing of the START button, the activity must start the counter by displaying the numbers from One and the counter must keep on counting until the STOP button is pressed. Display the counter value in a TextViewcontrol.

activity_main.xml


```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout 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:layout_width="wrap_content"
```

```xml
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="31dp"
        android:layout_marginBottom="385dp"
        android:text="@string/wallpaper_changer_app"
        android:textAlignment="center"
        android:textColor="@color/black"
        android:textSize="33sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="46dp"
        android:layout_marginBottom="249dp"
        android:text="@string/click_to_change_wallpaper"
        android:textSize="20sp"
        android:onClick="changeWallpaper"
        />

</RelativeLayout>
```

MainActivity.java

```java
package com.wallpaperchangerapp;

import androidx.appcompat.app.AppCompatActivity;

import android.app.WallpaperManager;
import android.graphics.Bitmap;
import android.graphics.drawable.BitmapDrawable;
import android.graphics.drawable.Drawable;
import android.os.Bundle;
import android.view.View;

import java.io.IOException;
import java.util.Timer;
import java.util.TimerTask;

public class MainActivity extends AppCompatActivity {

  Timer myTime;
```

```java
    Drawable drawable;
    WallpaperManager wpMan;
    int nextImg = 1;

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

        myTime = new Timer();
        wpMan = WallpaperManager.getInstance(this);
    }

    public void changeWallpaper(View view) {
        setWallpaper();
    }

    private void setWallpaper() {
        myTime.schedule(new TimerTask() {
            @Override
            public void run() {
                if (nextImg == 1){
                    drawable = getResources().getDrawable(R.drawable.img1);
                    nextImg = 2;
                } else if (nextImg == 2){
                    drawable = getResources().getDrawable(R.drawable.img2);
                    nextImg = 3;
                } else if (nextImg == 3){
                    drawable = getResources().getDrawable(R.drawable.img3);
                    nextImg = 4;
                } else if (nextImg == 4){
                    drawable = getResources().getDrawable(R.drawable.img4);
                    nextImg = 5;
                } else if (nextImg == 5){
                    drawable = getResources().getDrawable(R.drawable.img5);
                    nextImg = 6;
                } else {
                    drawable = getResources().getDrawable(R.drawable.img6);
                    nextImg = 1;
                }
                Bitmap imgBmp = ((BitmapDrawable)drawable).getBitmap();
                try {
                    wpMan.setBitmap(imgBmp);
                } catch (IOException e) {
                    e.printStackTrace();
                }
            }
        }, 30000, 2000);
    }
}
```
7. Develop a simple application with one EditText so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.

activity_main.xml

```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/txtView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/text_to_speech_application"
        android:textAllCaps="true"
        android:textColor="@color/black"
        android:textSize="25sp"
        android:textStyle="bold"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.105" />

    <EditText
        android:id="@+id/edtTxt"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="140dp"
        android:textAlignment="center"
        android:ems="10"
        android:inputType="textPersonName"
        android:hint="@string/enter_the_text"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.497"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/txtView" />

    <Button
        android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="140dp"
        android:textSize="20sp"
        android:lineHeight="1.5sp"
        android:text="@string/convert_text_to_speech"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
```

```
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/edtTxt" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

MainActivity.java

```java
package com.example.texttospeechapp;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.speech.tts.TextToSpeech;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;

import java.util.Locale;

public class MainActivity extends AppCompatActivity implements View.OnClickListener {
    EditText edt;
    Button btn;
    TextToSpeech textToSpeech;

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

        btn = (Button) findViewById(R.id.button);
        btn.setOnClickListener(this);
        edt = (EditText) findViewById(R.id.edtTxt);

        textToSpeech = new TextToSpeech(getApplicationContext(), new TextToSpeech.OnInitListener() {
            @Override
            public void onInit(int i) {
                if(i!=textToSpeech.ERROR) {
                    textToSpeech.setLanguage(Locale.ENGLISH);
                }
            }
        });
    }

    @Override
    public void onClick(View view) {
        textToSpeech.speak(edt.getText().toString(), textToSpeech.QUEUE_FLUSH, null);
    }
}
```

8. Create an activity like a phone dialer with CALL and SAVE buttons. On pressing the CALL button, it must call the phone number and on pressing the SAVE button it must save the number to the phone contacts.

activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout 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:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="32dp"
        android:layout_marginBottom="532dp"
        android:text="@string/call_and_save_application"
        android:textColor="@color/black"
        android:textSize="25sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.107" />

    <Button
        android:id="@+id/delbtn"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="33dp"
        android:layout_marginBottom="443dp"
        android:onClick="del"
        android:text="DEL" />

    <EditText
        android:id="@+id/phNum"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="161dp"
        android:layout_marginBottom="445dp"
        android:ems="10"
        android:hint="Enter number to call or save"
```

```xml
        android:inputType="textPersonName" />

    <Button
        android:id="@+id/button1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="273dp"
        android:layout_marginBottom="351dp"
        android:onClick="one"
        android:text="1" />

    <Button
        android:id="@+id/button2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="156dp"
        android:layout_marginBottom="351dp"
        android:onClick="two"
        android:text="2" />

    <Button
        android:id="@+id/button3"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="34dp"
        android:layout_marginBottom="350dp"
        android:onClick="three"
        android:text="3" />

    <Button
        android:id="@+id/button4"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="273dp"
        android:layout_marginBottom="278dp"
        android:onClick="four"
        android:text="4" />

    <Button
        android:id="@+id/button5"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
```

```
        android:layout_marginEnd="155dp"
        android:layout_marginBottom="279dp"
        android:onClick="five"
        android:text="5" />

    <Button
        android:id="@+id/button6"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="34dp"
        android:layout_marginBottom="278dp"
        android:onClick="six"
        android:text="6" />

    <Button
        android:id="@+id/button7"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="274dp"
        android:layout_marginBottom="210dp"
        android:onClick="seven"
        android:text="7" />

    <Button
        android:id="@+id/button8"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="155dp"
        android:layout_marginBottom="210dp"
        android:onClick="eight"
        android:text="8" />

    <Button
        android:id="@+id/button9"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentEnd="true"
        android:layout_alignParentBottom="true"
        android:layout_marginEnd="34dp"
        android:layout_marginBottom="210dp"
        android:onClick="nine"
        android:text="9" />

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

```xml
    android:layout_height="wrap_content"
    android:layout_alignParentEnd="true"
    android:layout_alignParentBottom="true"
    android:layout_marginEnd="222dp"
    android:layout_marginBottom="72dp"
    android:onClick="call"
    android:text="call" />

<Button
    android:id="@+id/buttonSave"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignParentEnd="true"
    android:layout_alignParentBottom="true"
    android:layout_marginEnd="92dp"
    android:layout_marginBottom="71dp"
    android:onClick="save"
    android:text="SAVE" />

<Button
    android:id="@+id/buttonHash"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignParentEnd="true"
    android:layout_alignParentBottom="true"
    android:layout_marginEnd="33dp"
    android:layout_marginBottom="143dp"
    android:onClick="hash"
    android:text="#" />

<Button
    android:id="@+id/buttonPlus"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignParentEnd="true"
    android:layout_alignParentBottom="true"
    android:layout_marginEnd="273dp"
    android:layout_marginBottom="142dp"
    android:onClick="plus"
    android:text="+" />

<Button
    android:id="@+id/button0"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignParentEnd="true"
    android:layout_alignParentBottom="true"
    android:layout_marginEnd="156dp"
    android:layout_marginBottom="142dp"
    android:onClick="zero"
    android:text="0" />
```

```
</RelativeLayout>
```

MainActivity.java

```java
package com.phoneapp;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.net.Uri;
import android.os.Bundle;
import android.provider.ContactsContract;
import android.view.View;
import android.widget.EditText;

public class MainActivity extends AppCompatActivity {
  EditText number;

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

    number = findViewById(R.id.phNum);
  }

  public void del(View view) {
    String numdel = number.getText().toString();
    numdel = numdel.substring(0, numdel.length()-1);
    number.setText(numdel);
  }

  public void one(View view) {
    number.append("1");
  }

  public void two(View view) {
    number.append("2");
  }

  public void three(View view) {
    number.append("3");
  }

  public void four(View view) {
    number.append("4");
  }

  public void five(View view) {
    number.append("5");
```

```java
  }

  public void six(View view) {
    number.append("6");
  }

  public void seven(View view) {
    number.append("7");
  }

  public void eight(View view) {
    number.append("8");
  }

  public void call(View view) {
    String myNumber = number.getText().toString();
    Intent it = new Intent(Intent.ACTION_DIAL, Uri.parse("tel:"+myNumber));
    startActivity(it);
  }

  public void nine(View view) {
    number.append("9");
  }

  public void save(View view) {
    String myNum = number.getText().toString();
    Intent it = new Intent(Intent.ACTION_INSERT, ContactsContract.Contacts.CONTENT_URI);
    it.putExtra(ContactsContract.Intents.Insert.PHONE, myNum);
    startActivity(it);
  }

  public void hash(View view) {
    number.append("#");
  }

  public void plus(View view) {
    number.append("+");
  }

  public void zero(View view) {
    number.append("0");
  }
}
```