**EXPERIMENT-2 SCIENTIFIC CALCULATOR**

**AIM:**

To develop a scientific calculator to perform arithmetic and mathematical functions using Math class.

**PROCEDURE:**

* Go to File → New Project.
* Provide the Application Name and click Next.
* Select the Target Android Devices.
* Choose the Minimum SDK required.
* Choose the activity (Blank Activity by default).
* Enter the Activity Name.
* Click Finish.
* Edit the program (design layout and write Kotlin code).
* Run the Application in 2 ways:
  1. Using an Emulator.
  2. Using a Real Mobile Device (via USB debugging).

**PROGRAM:**

**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"

package="com.example.scientificcalculator">

<application

android:allowBackup="true"

android:icon="@mipmap/ic\_launcher"

android:label="@string/app\_name"

android:roundIcon="@mipmap/ic\_launcher\_round"

android:supportsRtl="true"

android:theme="@style/Theme.ScientificCalculator"

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"?>

<ScrollView xmlns:android="http://schemas.android.com/apk/res/android"

xmlns:app="http://schemas.android.com/apk/res-auto"

android:layout\_width="match\_parent"

android:layout\_height="match\_parent"

android:padding="16dp">

<LinearLayout

android:layout\_width="match\_parent"

android:layout\_height="wrap\_content"

android:orientation="vertical"

android:gravity="center\_horizontal">

<com.google.android.material.textfield.TextInputLayout

android:layout\_width="match\_parent"

android:layout\_height="wrap\_content"

android:minHeight="56dp"

app:boxBackgroundMode="outline"

app:boxStrokeColor="@android:color/black">

<com.google.android.material.textfield.TextInputEditText

android:id="@+id/etInput"

android:layout\_width="match\_parent"

android:layout\_height="wrap\_content"

android:hint="Enter number(s) (e.g. 5 3)"

android:inputType="text"/>

</com.google.android.material.textfield.TextInputLayout>

<!-- Trigonometric Functions -->

<LinearLayout

android:layout\_width="match\_parent"

android:layout\_height="wrap\_content"

android:orientation="horizontal"

android:gravity="center"

android:paddingTop="16dp">

<Button android:id="@+id/btnSin" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="sin"/>

<Button android:id="@+id/btnCos" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="cos"/>

<Button android:id="@+id/btnTan" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="tan"/>

</LinearLayout>

<!-- Arithmetic Operations -->

<LinearLayout

android:layout\_width="match\_parent"

android:layout\_height="wrap\_content"

android:orientation="horizontal"

android:gravity="center"

android:paddingTop="8dp">

<Button android:id="@+id/btnAdd" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="+"/>

<Button android:id="@+id/btnSubtract" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content"

android:text="-"/>

<Button android:id="@+id/btnMultiply" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="\*"/>

<Button android:id="@+id/btnDivide" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="/"/>

</LinearLayout>

<!-- Scientific Functions -->

<LinearLayout

android:layout\_width="match\_parent"

android:layout\_height="wrap\_content"

android:orientation="horizontal"

android:gravity="center"

android:paddingTop="8dp">

<Button android:id="@+id/btnSqrt" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="√"/>

<Button android:id="@+id/btnPow" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="^"/>

<Button android:id="@+id/btnLog" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="ln"/>

<Button android:id="@+id/btnMod" android:layout\_width="wrap\_content" android:layout\_height="wrap\_content" android:text="%"/>

</LinearLayout>

<!-- Result Display -->

<TextView

android:id="@+id/tvResult"

android:layout\_width="match\_parent"

android:layout\_height="wrap\_content"

android:text="Result:"

android:textSize="24sp"

android:gravity="center"

android:paddingTop="24dp"/>

</LinearLayout>

</ScrollView>

# **MainActivity.kt:**

package com.example.scientificcalculator

import android.os.Bundle

import android.widget.\*

import androidx.appcompat.app.AppCompatActivity

import kotlin.math.\*

class MainActivity : AppCompatActivity() {

private lateinit var input: EditText

private lateinit var resultView: TextView

override fun onCreate(savedInstanceState: Bundle?) {

super.onCreate(savedInstanceState)

setContentView(R.layout.activity\_main)

input = findViewById(R.id.etInput)

resultView = findViewById(R.id.tvResult)

setClick(R.id.btnAdd) { calculateBinary("+") }

setClick(R.id.btnSubtract) { calculateBinary("-") }

setClick(R.id.btnMultiply) { calculateBinary("\*") }

setClick(R.id.btnDivide) { calculateBinary("/") }

setClick(R.id.btnPow) { calculateBinary("^") }

setClick(R.id.btnMod) { calculateBinary("%") }

setClick(R.id.btnSin) { calculateSingle { sin(Math.toRadians(it)) } }

setClick(R.id.btnCos) { calculateSingle { cos(Math.toRadians(it)) } }

setClick(R.id.btnTan) { calculateSingle { tan(Math.toRadians(it)) } }

setClick(R.id.btnSqrt) { calculateSingle { if (it >= 0) sqrt(it) else

return@calculateSingle null } }

setClick(R.id.btnLog) { calculateSingle { if (it > 0) ln(it) else return@calculateSingle null } }

}

private fun setClick(buttonId: Int, action: () -> Unit) {

findViewById<Button>(buttonId).setOnClickListener { action() }

}

private fun calculateSingle(operation: (Double) -> Double?) {

val number = input.text.toString().toDoubleOrNull()

if (number != null) {

val result = operation(number)

resultView.text = "Result: ${result ?: "Invalid input"}"

} else {

showError()

}

}

private fun calculateBinary(op: String) {

val parts = input.text.toString().split(" ")

if (parts.size != 2) {

resultView.text = "Enter two numbers separated by space"

return

}

val a = parts[0].toDoubleOrNull()

val b = parts[1].toDoubleOrNull()

if (a == null || b == null) {

showError()

return

}

val result = when (op) {

"+" -> a + b

"-" -> a - b

"\*" -> a \* b

"/" -> if (b != 0.0) a / b else "Error: Division by zero"

"^" -> a.pow(b)

"%" -> a % b

else -> "Unknown"

}

resultView.text = "Result: $result"

}

private fun showError() {

Toast.makeText(this, "Invalid input!", Toast.LENGTH\_SHORT).show()

}

}