Answers **(5)**	Coding Efficiency **(5)**	Viva **(5)**	Timely Completion **(5)**	Total **(20)**	Dated Sign of Subject Teacher

Expected Date of Completion:----------

Actual Date of Completion:----------

Assignment Group B-4

Problem Definition:

Develop a native application that uses GPS location information.

4.1 Learning Objectives:

1. Introduction to Android Platform
2. To study the representation, implementation of GPS location information

4.2 Learning outcome:

Use Flutter Framework with geolocation plugin to get GPS location information

4.3 Theory

4.3.1 GPS

The Global Positioning System (GPS), originally Navstar GPS, is a satellite-based radio navigation system owned by the United States government and operated by the United States Space Force. It is one of the global navigation satellite systems (GNSS) that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. It does not require the user to transmit any data, and operates independently of any telephonic or Internet reception, though these technologies can enhance the usefulness of the GPS positioning information. It provides critical positioning capabilities to military, civil, and commercial users around the world. Although the United States government created, controls and

maintains the GPS system, it is freely accessible to anyone with a GPS receiver.

When selective availability was lifted in 2000, GPS had about a five-meter (16 ft) accuracy. GPS receivers that use the L5 band have much higher accuracy, pinpointing to within 30 centimeters (11.8 in), while high-end users (typically engineering and land surveying applications) are able to have accuracy on several of the bandwidth signals to within two centimeters, and even sub-millimeter accuracy for long-term measurements. Consumer devices, like smartphones, can be as accurate as to within 4.9 m (or better with assistive services like Wi-Fi positioning also enabled). As of May 2021, 16 GPS satellites are broadcasting L5 signals, and the signals are considered pre-operational, scheduled to reach 24 satellites by approximately 2027.

4.3.2 Principles

The GPS receiver calculates its own four-dimensional position in spacetime based on data received from multiple GPS satellites. Each satellite carries an accurate record of its position and time, and transmits that data to the receiver. The satellites carry very stable atomic clocks that are synchronized with one another and with ground clocks. Any drift from time maintained on the ground is corrected daily. In the same manner, the satellite locations are known with great precision. GPS receivers have clocks as well, but they are less stable and less precise. Since the speed of radio waves is constant and independent of the satellite speed, the time delay between when the satellite transmits a signal and the receiver receives it is proportional to the distance from the satellite to the receiver. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities (three position coordinates and the deviation of its own clock from satellite time).

11.3 Practical implementation

First create a flutter project using command “**flutter create <Project Name>**”
Add user permission in “android\app\src\main\AndroidManifest.xml” to access the location of a user.

```
<uses-permission
```

```
android:name="android.permission.ACCESS_FINE_LOCATION" />
```

Add geocoding and geolocation plugin in “pubspec.yaml” file

```
dependencies:
      flutter:
          sdk: flutter
      geocoding: ^1.0.5
      geolocator: ^6.1.1
```

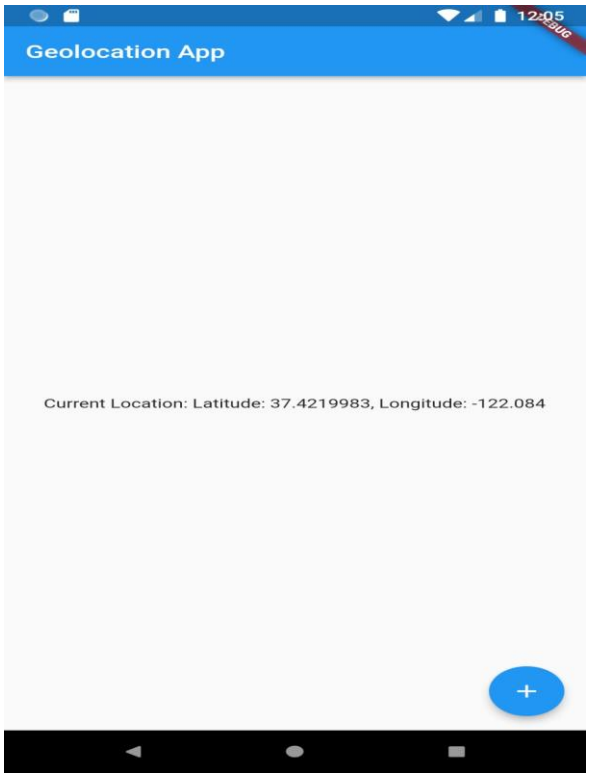
main.dart file:

```
import 'package:flutter/material.dart';
import 'package:geolocator/geolocator.dart';

void main() {
  runApp(const MyApp());
}

class MyApp extends StatelessWidget {
  const MyApp({Key? key}) : super(key: key);

  // This widget is the root of your application.
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      title: 'Flutter Demo',
      theme: ThemeData(

        primarySwatch: Colors.blue,
      ),
      home: const MyHomePage(title: 'Flutter Demo Home Page'),
```

```
    );
  }
}

class MyHomePage extends StatefulWidget {
  const MyHomePage({Key? key, required this.title}) : super(key: key);

  // This widget is the home page of your application. It is stateful,
meaning
  // that it has a State object (defined below) that contains fields that
affect
  // how it looks.

  // This class is the configuration for the state. It holds the values (in
this
  // case the title) provided by the parent (in this case the App widget)
and
  // used by the build method of the State. Fields in a Widget subclass are
  // always marked "final".

  final String title;

  @override
  State<MyHomePage> createState() => _MyHomePageState();
}

class _MyHomePageState extends State<MyHomePage> {

  Position? _position;

  void _getCurrentLocation() async {
    Position position = await _determinePosition();
    setState(() {
      _position = position;
    });
  }

  Future<Position> _determinePosition() async {
    LocationPermission permission;

    permission = await Geolocator.checkPermission();

    if(permission == LocationPermission.denied) {
      permission = await Geolocator.requestPermission();
      if(permission == LocationPermission.denied) {
        return Future.error('Location Permissions are denied');
      }
    }

    return await Geolocator.getCurrentPosition();
  }
```

```
  @override
  Widget build(BuildContext context) {
    // This method is rerun every time setState is called, for instance as
done
    // by the _incrementCounter method above.
    //
    // The Flutter framework has been optimized to make rerunning build
methods
    // fast, so that you can just rebuild anything that needs updating
rather
  // than having to individually change instances of widgets.
    return Scaffold(
      appBar: AppBar(
        // Here we take the value from the MyHomePage object that was
created by
        // the App.build method, and use it to set our appbar title.
        title: Text("Geolocation App"),
      ),
      body: Center(
        child: _position != null ? Text('Current Location: ' +
_position.toString()) : Text('No Location Data'),
      ),
      floatingActionButton: FloatingActionButton(
        onPressed: _getCurrentLocation,
        tooltip: 'Increment',
        child: const Icon(Icons.add),
      ), // This trailing comma makes auto-formatting nicer for build
methods.
    );
  }
}
```

Output:



4.4 Assignment Questions:

Q1.What is GPS?

Q2.Explain GPS Architecture.

Q3.List Applications of GPS.

Conclusion: Hence, we have successfully studied the concept of GPS in which we developed a native application that uses GPS location information.