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| **III B.Tech I Semester** | **Tinkering Lab**  **(*User Interface Design using Flutter*)** | **L** | **T** | **P** | **C** |
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**List of Experiments:**

Students need to implement the following experiments

1. a) Install Flutter and Dart SDK.

b) Write a simple Dart program to understand the language basics.

1. a) Explore various Flutter widgets (Text, Image, Container, etc.).

b) Implement different layout structures using Row, Column, and Stack widgets.

1. a) Design a responsive UI that adapts to different screen sizes.

b) Implement media queries and breakpoints for responsiveness.

1. a) Set up navigation between different screens using Navigator.

b) Implement navigation with named routes.

1. a) Learn about stateful and stateless widgets.

b) Implement state management using set State and Provider.

1. a) Create custom widgets for specific UI elements.

b) Apply styling using themes and custom styles.

1. a) Design a form with various input fields.

b) Implement form validation and error handling.

1. a) Add animations to UI elements using Flutter's animation framework.

b) Experiment with different types of animations (fade, slide, etc.).

1. a) Fetch data from a **Integrated REST API**.

b) Display the fetched data in a meaningful way in the UI.

1. a) Write unit tests for UI components.

b) Use Flutter's debugging tools to identify and fix issues.

**Text Book:**

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.
2. Rap Payne, Beginning App Development with Flutter: Create Cross-Platform Mobile Apps 1st Edition, Apres.

### Online Resources:

* <https://www.linkedin.com/learning/flutter-essential-training-build-for-multiple-platforms?u=285479924>
* <https://www.udemy.com/course/learn-flutter-beginners-course/?srsltid=AfmBOoqpRMiurRhyasfozPTlFctAtRSROfT8jSnvVgCC9_gSpASVENMY>
* <https://www.simplilearn.com/free-flutter-foundation-course-skillup>

### Software Required:

* VSCode with Flutter SDK& Dart SDK plugins
* Android Studio with Flutter SDK& Dart SDK plugins
* Android Emulator

***Justification:* Integrated REST API** Integrated REST API in Flutter builds foundational skills in client-server communication, enabling data-driven app development and real-time backend connectivity.

1. **a) Install Flutter and Dart SDK.**

**AIM:** To install Flutter and the Dart SDK, you can follow these steps:

a) Download Flutter: Visit the Flutter website's Get Started page and download the Flutter SDK for your operating system (Windows, macOS, or Linux).

b) Extract the Flutter SDK: After downloading, extract the contents of the compressed file to a location on your computer where you want to store the Flutter SDK. For example, you can extract it to C:\flutter on Windows, /Users/<your-username>/flutter on macOS, or ~/flutter on Linux.

c) Add Flutter to your PATH: Update your system's PATH variable to include the Flutter bin

directory. This step allows you to execute Flutter commands from any directory in your terminal or command prompt. The precise steps for updating the PATH vary depending on your operating system.

**Windows:** From the Start search bar, type 'env' and select 'Edit the system environment

variables'. Click on 'Environment Variables'. Under 'System Variables', find the 'Path' variable, select it, and click 'Edit'. Click 'New' and add the path to the bin directory insidethe Flutter directory (e.g., C:\flutter\bin). Click 'OK' on all open dialogs to save your changes.

**macOS and Linux:** Open a terminal window.

Run the following command to open the profile file associated with your terminal

(.bash\_profile, .bashrc, .zshrc, or similar):

nano ~/.bash\_profile Add the following line at the end of the file:

export PATH="$PATH:/path/to/flutter/bin"

Press Ctrl + X to exit, then Y to save changes, and Enter to confirm.

d) Verify the Flutter installation: Open a new terminal window, and run the following

command to verify that Flutter is properly installed: flutter –version. This command should display the Flutter version and other relevant information if the installation was successful.

e) Install Flutter dependencies: Depending on your development environment, you may need to install additional dependencies, such as Android Studio to fully set up your Flutter development environment.

f) Download Dart SDK (if not bundled with Flutter): Flutter comes with the Dart SDK

bundled, so if you've installed Flutter, you should have the Dart SDK as well. However, if you need to install Dart separately, you can download it from the Dart "SDK archive".

**b) Write a simple dart program to understand the language basics.**

import 'package:flutter/material.dart';

void main() {

runApp(Abc());

}

class Abc extends StatelessWidget {

@override

Widget build(BuildContext context) {

return MaterialApp(

home: Def(),

);

}

}

class Def extends StatelessWidget {

const Def({super.key});

@override

Widget build(BuildContext context) {

return Scaffold(

appBar: AppBar(

title: Text("Welcome"),

backgroundColor: Colors.purple,

),

body: Column(

children: [

//Widgets

],

),

);

}

}