

# Vivekanand Education Society's Institute of Technology

An Autonomous Institute Affiliated to University of Mumbai  
Hashu Advani Memorial Complex, Collector Colony, Chembur East, Mumbai - 400074.



## Department of Information Technology

### CERTIFICATE

This is to certify that Nishtha Joshi of **D15B** semester **VI**, have successfully completed necessary experiments in the MAD & PWA Lab under my supervision in **VES Institute of Technology** during the academic year **2023-2024**.

Lab Assistant

Subject Teacher

**Dr. Ravita Mishra**

Principal

Head of Department

**Dr. Mrs. Shalu Chopra**

Name of the Course : MAD & PWA Lab

Course Code : ITL604

**Year/Sem/Class** : D15B**A.Y.:** 23-24**Faculty Incharge** : Dr. Ravita Mishra**Lab Teachers** : Dr. Ravita Mishra.**Email** : [ravita.mishra@ves.ac.in](mailto:ravita.mishra@ves.ac.in)**Programme Outcomes:** The graduate will be able to:

PO1) Basic Engineering knowledge: An ability to apply the fundamental knowledge in mathematics, science and engineering to solve problems in Computer engineering.

PO2) Problem Analysis: Identify, formulate, research literature and analyze computer engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and computer engineering and sciences.

PO3) Design/ Development of Solutions: Design solutions for complex computer engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

PO4) Conduct investigations of complex engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5) Modern Tool Usage: Create, select and apply appropriate techniques, resources and modern computer engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6) The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to computer engineering practice.

PO7) Environment and Sustainability: Understand the impact of professional computer engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO8) Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of computer engineering practice.

PO9) Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

PO10) Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO11) Project Management and Finance: Demonstrate knowledge and understanding of computer engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12) Life-long Learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

**Program specific Outcomes**

**PSO1)** An ability to manage and analyze data / information effectively for making better decisions.

**PSO2)** Demonstrate the ability to use state of the art technologies and tools including Free and Open Source Software (FOSS) tools in developing software.

**Lab Objectives:**

| Sr. No.                          | Lab Objectives   |
|----------------------------------|--|
| <b>The Lab experiments aims:</b> |  |
| 1                                | Learn the basics of the Flutter framework.   |
| 2                                | Develop the App UI by incorporating widgets, layouts, gestures and animation                                     |
| 3                                | Create a production ready Flutter App by including files and firebase backend service.                           |
| 4                                | Learn the Essential technologies, and Concepts of PWAs to get started as quickly and efficiently as possible     |
| 5                                | Develop responsive web applications by combining AJAX development techniques with the jQuery JavaScript library. |
| 6                                | Understand how service workers operate and also learn to Test and Deploy PWA.                                    |

**Lab Outcomes:**

| Sr. No.   | Lab Outcomes  | Cognitive levels of attainment as per Bloom's Taxonomy |
|---|---|--|
| <b>On Completion of the course the learner/student should be able to:</b> |   |  |
| 1   | Understand cross platform mobile application development using Flutter framework                                | L1, L2   |
| 2   | Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation                    | L3   |
| 3   | Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS | L3, L4   |
| 4   | Understand various PWA frameworks and their requirements  | L1, L2   |
| 5   | Design and Develop a responsive User Interface by applying PWA Design techniques                                | L3   |
| 6   | Develop and Analyse PWA Features and deploy it over app hosting solutions                                       | L3, L4   |

# Index

| Sr. No | Experiment Title   | LO          | DOP     | DOS     | Grade |
|--------|--|-------------|---------|---------|-------|
| 1.     | To install and configure the Flutter Environment   | LO1         | 10/1/24 | 17/1/24 | 14    |
| 2.     | To design Flutter UI by including common widgets.  | LO2         | 17/1/24 | 24/1/24 | 13    |
| 3.     | To include icons, images, fonts in Flutter app   | LO2         | 24/1/24 | 31/1/24 | 15    |
| 4.     | To create an interactive Form using form widget  | LO2         | 31/1/24 | 7/2/24  | 14    |
| 5.     | To apply navigation, routing and gestures in Flutter App   | LO2         | 7/2/24  | 14/2/24 | 14    |
| 6.     | To Connect Flutter UI with fireBase database   | LO3         | 14/2/24 | 21/2/24 | 15    |
| 7.     | To write meta data of your Ecommerce PWA in a Web app manifest file to enable “add to homescreen feature”.                             | LO4         | 21/2/24 | 2/2/24  | 14    |
| 8.     | To code and register a service worker, and complete the install and activation process for a new service worker for the E-commerce PWA | LO5         | 28/2/24 | 6/3/24  | 14    |
| 9.     | To implement Service worker events like fetch, sync and push for E-commerce PWA  | LO5         | 6/3/24  | 13/3/24 | 14    |
| 10.    | To study and implement deployment of Ecommerce PWA to GitHub Pages.  | LO5         | 13/3/24 | 20/3/24 | 14    |
| 11.    | To use google Lighthouse PWA Analysis Tool to test the PWA functioning.  | LO6         | 20/3/24 | 27/3/24 | 14    |
| 12.    | Assignment-1   | LO1,LO2,LO3 | 23/1/24 | 31/1/24 | 5     |
| 13.    | Assignment-2   | LO4,LO5,LO6 | 31/1/24 | 14/2/24 | 5     |

# MAD & PWA Lab

## Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 01  |
| Experiment Title. | To install and configure the Flutter Environment                                      |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15B  |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO1: Understand cross platform mobile application development using Flutter framework |
| Grade:            | 14  |

## MAD & PWA Lab

### Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 02  |
| Experiment Title. | To design Flutter UI by including common widgets.   |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15B  |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO2: Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation |
| Grade:            | 13  |

# MAD & PWA Lab

## Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 03  |
| Experiment Title. | To include icons, images, fonts in Flutter app  |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15B  |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO2: Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation |
| Grade:            | 15  |



# MAD & PWA Lab

## Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 04  |
| Experiment Title. | To create an interactive Form using form widget   |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15B  |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO2: Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation |
| Grade:            | 14  |

# MAD & PWA Lab

## Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 05  |
| Experiment Title. | To apply navigation, routing and gestures in Flutter App  |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15B  |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO2: Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation |
| Grade:            | 14  |

# MAD & PWA Lab

## Journal

|                   |  |
|-------------------|--|
| Experiment No.    | 06   |
| Experiment Title. | To Connect Flutter UI with fireBase database   |
| Roll No.          | 25   |
| Name              | Nishtha Joshi  |
| Class             | D15B   |
| Subject           | MAD & PWA Lab  |
| Lab Outcome       | LO3: Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS |
| Grade:            | 15   |

# MAD & PWA Lab

## Journal

|                   |  |
|-------------------|--|
| Experiment No.    | 07   |
| Experiment Title. | To write meta data of your Ecommerce PWA in a Web app manifest file to enable “add to homescreen feature”. |
| Roll No.          | 25   |
| Name              | Nishtha Joshi  |
| Class             | D15B   |
| Subject           | MAD & PWA Lab  |
| Lab Outcome       | LO4: Understand various PWA frameworks and their requirements  |
| Grade:            | 14   |

# MAD & PWA Lab

## Journal

|                   |  |
|-------------------|--|
| Experiment No.    | 08   |
| Experiment Title. | To code and register a service worker, and complete the install and activation process for a new service worker for the E-commerce PWA |
| Roll No.          | 25   |
| Name              | Nishtha Joshi  |
| Class             | D15B   |
| Subject           | MAD & PWA Lab  |
| Lab Outcome       | LO5: Design and Develop a responsive User Interface by applying PWA Design techniques  |
| Grade:            | 14   |

# MAD & PWA Lab

## Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 09  |
| Experiment Title. | To implement Service worker events like fetch, sync and push for E-commerce PWA       |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15B  |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO5: Design and Develop a responsive User Interface by applying PWA Design techniques |
| Grade:            | 14  |

# MAD & PWA Lab

## Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 10  |
| Experiment Title. | To study and implement deployment of Ecommerce PWA to GitHub Pages.                   |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15B  |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO5: Design and Develop a responsive User Interface by applying PWA Design techniques |
| Grade:            | 14  |

# MAD & PWA Lab

## Journal

|                   |   |
|-------------------|---|
| Experiment No.    | 11  |
| Experiment Title. | To use google Lighthouse PWA Analysis Tool to test the PWA functioning.       |
| Roll No.          | 25  |
| Name              | Nishtha Joshi   |
| Class             | D15A/D15B   |
| Subject           | MAD & PWA Lab   |
| Lab Outcome       | LO6: Develop and Analyze PWA Features and deploy it over app hosting solution |
| Grade:            | 14  |



# MAD & PWA Lab

## Journal

|                        |   |
|------------------------|---|
| Experiment No.         | Assignment-1  |
| Assignment 1 Questions | <p>1. a) Explain the key features and advantages of using Flutter for mobile app development.<br/>b) Discuss how the Flutter framework differs from traditional approaches and why it has gained popularity in the developer community.</p> <p>2. a) Describe the concept of the widget tree in Flutter. Explain how widget composition is used to build complex user interfaces.<br/>b) Provide examples of commonly used widgets and their roles in creating a widget tree.</p> <p>3. a) Discuss the importance of state management in Flutter applications.<br/>b) Compare and contrast the different state management approaches available in Flutter, such as setState, Provider, and Riverpod. Provide scenarios where each approach is suitable.</p> <p>4. a) Firebase Integration in Flutter: Explain the process of integrating Firebase with a Flutter application.<br/>b) Discuss the benefits of using Firebase as a backend solution. Highlight the Firebase services commonly used in Flutter development and provide a brief overview of how data synchronization is achieved.</p> |
| Roll No.               | 25  |
| Name                   | Nishtha Joshi   |
| Class                  | D15B  |
| Subject                | MAD & PWA Lab   |
| Lab Outcome            | <p>LO1: Understand cross platform mobile application development using Flutter framework</p> <p>LO2: Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation</p> <p>LO3: Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS</p>   |
| Grade:                 | 5   |

# MAD & PWA Lab

## Journal

|                        |  |
|------------------------|--|
| Experiment No.         | Assignment-2   |
| Assignment 2 Questions | <ol style="list-style-type: none"><li>1. Define Progressive Web App (PWA) and explain its significance in modern web development. Discuss the key characteristics that differentiate PWAs from traditional mobile apps</li><li>2. Define responsive web design and explain its importance in the context of Progressive Web Apps. Compare and contrast responsive, fluid, and adaptive web design approaches.</li><li>3. Describe the lifecycle of Service Workers, including registration, installation, and activation phases.</li><li>4. Explain the use of IndexedDB in the Service Worker for data storage.</li></ol> |
| Roll No.               | 25   |
| Name                   | Nishtha Joshi  |
| Class                  | D15B   |
| Subject                | MAD & PWA Lab  |
| Lab Outcome            | LO4: Understand various PWA frameworks and their requirements<br>LO5: Design and Develop a responsive User Interface by applying PWA Design techniques<br>LO6: Develop and Analyze PWA Features and deploy it over app hosting solutions   |
| Grade:                 | 5  |