Project Design Phase
Proposed Solution Template

Date	28 June 2025
Team ID	LTVIP2025TMID35624
Project Name	Revolutionizing Liver Care: Predicting Liver Cirrhosis Using Advanced Machine Learning Techniques
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Liver cirrhosis is a life-threatening condition that often goes undetected until it reaches an advanced stage. Early diagnosis is critical for effective treatment and improved survival rates. However, traditional diagnostic methods are invasive, time-consuming, and costly, making early detection inaccessible for many. This delay leads to missed opportunities for early intervention and worsens health outcomes. There is a pressing need for a non-invasive, accessible, and accurate method for early liver cirrhosis detection.
2.	Idea / Solution description	This project aims to revolutionize liver care by leveraging advanced machine learning techniques to detect liver cirrhosis at an early stage using non-invasive clinical and laboratory data such as age, gender, medical history, and blood test results. The system is trained to identify hidden patterns within patient data to produce reliable binary predictions (Cirrhosis: Yes/No). It will be deployed as a web or mobile interface, where users can enter relevant health information and receive immediate, data-driven predictions, facilitating timely medical intervention.
3.	Novelty / Uniqueness	1. Non-invasive and low-cost approach using routine medical data (no imaging or biopsy required). 2. Implements multiple ML classifiers including Random Forest, Logistic Regression, XGBoost, and KNN, with cross-validation and hyperparameter tuning for model optimization. 3. Designed for real-time accessibility via a user-friendly platform.

		4. Unique focus on early detection, especially for underserved populations who lack access to advanced diagnostics.
4.	Social Impact / Customer Satisfaction	1.Empowers patients with early awareness of their liver health. 2.Reduces the financial and physical burden of traditional diagnostic procedures. 3.Improves clinical outcomes through timely and personalized treatment. 4.Enhances customer trust and peace of mind by providing fast, reliable, and private health assessments. 5.Particularly impactful for rural, economically challenged, or elderly populations with limited access to specialists.
2.	Business Model (Revenue Model)	Freemium Model
3.	Scalability of the Solution	1. Highly scalable due to its cloud-based deployment(onrender.com), supporting large user volumes. 2. Easily adaptable across different geographies or patient populations by retraining the model with localized data. 3. Modular architecture enables future expansion to predict other chronic liver diseases or complications. 4. Can be integrated with telemedicine platforms or offered as a plug-in to existing health management systems.