SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE		DEPARTMENT OF COMPUTER SCIENCE ENGINEERING	
Program Name: B. Tech		**Assignment Type:** Lab	**Academic Year:** 2025-26
Course Coordinator Name		Dr.Vairachilai Shenbagavel	
Instructor(s) Name		Srinivas Komakula	
Course Code	23CA201SE402	**Course Title**	Explainable AI (P)
Year/Sem	III/V	**Regulation**	R24
Date and Day of Assignment	28-08-2025	**Time(s)**	09:00AM -05:00PM
Duration	2 Hours	**Applicable to Batch**	**23CSBTB31**
Assignment Number: 04			

Q. No.	Question	Expected Time to complete
1	**Assignment 4 — California Housing (Regression)**	

Objectives:

- Compute and interpret feature importance using **Permutation Importance**.
- Explain predictions globally and locally using **SHAP**.
- Compare local explanations using **LIME**.
- Communicate similarities/differences between the three techniques.

Assignment Details:

- **Goal:** Identify which housing features most influence predicted house value, and compare explanations across methods.
- **Data:** `sklearn.datasets.fetch_california_housing()`
- **Model:** `RandomForestRegressor`
- **Steps:**
  1. Train RandomForestRegressor on California Housing dataset.
  2. **Permutation Importance:** Compute importance on test set (`n_repeats ≥ 10`), plot bar chart.
  3. **SHAP:** Use TreeExplainer to compute SHAP values, plot summary (global) and force plot (1 sample).
  4. **LIME:** Use LimeTabularExplainer to explain 2 test predictions.
  5. Compare results across methods.
- **Deliverables:**
  - Permutation Importance plot.
  - SHAP summary + one local force plot.
  - LIME explanations for 2 samples.
  - Comparative discussion: which features are consistently important, where methods differ.

Submission Requirements:

- Short methods summary (3–5 lines).
- Clean, runnable code/notebook.
- Plots: permutation, SHAP summary, SHAP local, 2 LIME plots.
- 5–10 bullet insights comparing PI, SHAP, and LIME.