CHAPTER 3
THESIS OBJECTIVES

3.1 INTRODUCTION

From the literature survey, it is concluded that only a considerable research has been carried out in the field of biogas production. There is no literature so far to produce the biogas from Prosopis juliflora pods by anaerobic digestion and preheating the biogas and air mixture using engine exhaust gas in a dual fuel diesel engine.

3.2 PROBLEM IDENTIFICATION FROM LITERATURE SURVEY

- Prosopis juliflora trees are an invasion into crop fields, wetlands and lakeshore area and intoxication by pods causes an impairment of cranial nerve function in cattle and goats.
- There is no literature so far to produce the biogas from Prosopis juliflora pods by anaerobic digestion.
- In this work, the anaerobic co-digestion of Prosopis juliflora pods and a blend of dry leaves, and water hyacinth (co-feed materials) and CM (inoculum) were studied in different experiments.
- In the previous literature, intake air temperature shows significant impacts on both performance and exhaust gas characteristics of diesel dual-fuel engines.
In this work, an experimental study was undertaken to investigate the DFDE performance characteristics on non-preheated BAM and preheated BAM at different temperature.

3.3 THESIS OBJECTIVES

The objective of this study was to evaluate the methane composition and biogas yield. Biogas yield was measured in terms of daily biogas yield and cumulative biogas yield.

- Initially, the experimental test was carried out in anaerobic digestion of seven different biomass waste materials.
- To evaluate the effect of effluent filtrate with feed materials on batch and continuous type anaerobic digestion.
- To optimize the ratio of co-feed materials and inoculum with PJ pods which enhances the biogas production, from twenty different experiments.
- To optimize the operating condition, a central-composite design (CCD) and response surface methodology (RSM) were used. Average biogas production (l/d), cumulative biogas yield (l/kg), and methane content (l/kg) were chosen as the response variables, while pH and temperature (°C) were selected as two independent variables.

To determine the performance of biogas in a single cylinder, CI engine, operating under pilot ignited dual fuel (diesel fuel) operating mode. The results highlight the outcome of the brake power (BP), brake specific fuel consumption (BSFC), brake thermal efficiency (BTE), exhaust gas temperature (EGT), brake specific energy consumption (BSEC), as well as the CO, CO₂ and CH₄ emissions, for various engine loading conditions.
➢ The first category was non-preheated BAM and preheated BAM at different temperature (55±5, 65±5, 75±5 and 85±5 °C).
➢ The second category was a various range of methane concentration by purifying the biogas.