Chapter 3

OBJECTIVES AND METHODOLOGY

3.1 OBJECTIVES

Based on the literature review the objectives of the present investigation are

- To obtain the biodiesel by transesterification of raw Jatropha, Pongamia, Neem, Cottonseed and Mahua oil and to evaluate their properties by standard methods.

- To prepare the blends by mixing each of the oils with diesel in proportions of 10%, 20%, 30%, 40% and 50% by volume, to determine the performance, combustion and emission characteristics of these blends by employing a single cylinder air-cooled four stroke direct injection diesel engine.

- To determine the optimum blend for each of the oils used and analyze the same based on the performance and emission characteristics.

- To analyze the combustion characteristics of the optimum blends by Pressure –Crank angle diagram, and the delay period.

- \( \text{NO}_x \) reduction by employing EGR technology for the overall optimum blend.
3.2 METHODOLOGY

The methodology adopted is outlined below in a step-by-step manner.

- Selection of suitable vegetable oils (Jatropha oil, Cottonseed oil, Pongamia oil, Neem oil and Mahua oil) for the study.
- Production of methyl esters of Jatropha oil, Cottonseed oil, Pongamia oil, Neem oil and Mahua oil by transesterification process.
- Determination of the properties of these esterified oils by standard methods.
- Developing an experimental setup with necessary loading devices and other instrumentation to study the performance, combustion and emission characteristics of the diesel engine fuelled with different blends of the selected oils.
- Providing an additional EGR circuit consisting of an orifice meter, a surge tank, a manometer and a flow control valve for employing EGR upto 25% to reduce NO\textsubscript{X} emission for the optimum blend.
- Conducting experiments and analyzing the combustion, performance and emission characteristics of the diesel engine running on biodiesel blends.
- Finally the optimal blend for each of the oil is determined based on the criteria such as higher brake thermal efficiency and lower specific fuel consumption and lesser emissions.