The world has witnessed industrial revolution within the past 2 centuries and faced serious issues of indiscriminate utilization of energy resources. This has resulted in severe environmental degradation and really high dependence on fossil fuels. As a result of this, the researchers everywhere in the world are experimenting for the generation of the substitute energy resources to keep up economic development.

A major solution to cut back this drawback is to look for an alternate fuel. Vegetable oils may be used as an alternate to the fossil fuel, since they're renewable and may be made in rural areas. The creator of internal-combustion engine Rudolf Diesel predicted that the plant based oils are wide accustomed to operate internal-combustion engine. The vegetable oils have nice potentials as an alternative fuel. However use of pure oil will cause varied engine connected drawbacks like injector choking, piston deposit formation and piston ring sticking as a result of higher viscosity and low volatility.

The best technique of use of vegetable oils in internal-combustion engine is by modifying the vegetable oils into its monoesters (biodiesel) by transestrification method. Transestrification of vegetable oils provides a big reduction in viscosity, thereby enhancing their physical and chemical properties and improve the engine performance. Biodiesel, as outlined by “American Society for Testing and Materials” (ASTM) may be a fuel comprised of mono- alkyl group esters of long chain fatty acids derived from vegetable oils, or animal fats. Though the biodiesel has several blessings over pure oil,
it's disadvantages like low hot worth, higher viscosity, poor cold flow properties and high pollutant emission as compared with diesel. This drawback may be managed with the employment of blended fuel of biodiesel and diesel fuel.

As a result of low volatility and high viscosity of biodiesel the thermal potency of the engine with biodiesel blends is low as compared with diesel. The thermal potency of biodiesel engine may be improved with low heat rejection engine that keeps the hot atmosphere within the combustion chamber by providing thermal insulation within the piston, combustion chamber, cylinder liners etc. with low thermal phenomenon materials.

In order to attain above needs in the present work experiments were conducted on a four stroke internal-combustion engine with 5 totally different biodiesel blends (i.e. Jatropha, Karanja, Mahua, cotton seed and neem tree biodiesels) one by one to gauge its performance. Experiments are also conducted on insulated engine, which is developed by employing varied piston inserts created with totally different thermal conductivity phenomenon metals like Copper, Cast iron, Brass, in every case an air-gap is provided between piston skirt and the crown. The performance and emission characteristics of the engine are studied.

These studies are conferred (presented) within the thesis. The thesis contains eight chapters. The data enclosed in each and every chapter is shown below.
Chapter-1: Introduction

In this chapter a brief introduction regarding the biodiesels and their properties, engine thermal insulation and its edges (benefits) are conferred in this chapter.

Chapter-2: Review of literature

In this chapter the contributions of eminent researchers within the field of the use of biodiesels in CI engines are conferred. Parameters like engine performance and emission characteristics are mentioned. The numerous conclusions drawn by different authors and the scope of this research work are also conferred.

Chapter-3: Experimental setup and test procedure

This chapter discusses the details of the test engine and instruments accustomed to assess the performance and emission characteristics on varied stages of investigations.

Chapter-4: Experimental investigations

In this chapter experimental investigations conducted in varied stages to gauge the performance parameters like brake thermal potency, brake specific fuel consumption and emissions like CO, HC, NOx and smoke density are conferred.

Chapter-5: Results and discussions

The chapter discusses regarding the results of the experimental investigation conducted in varied stages.

Chapter-6: Conclusions

In this chapter the final conclusions of this experimental work and scope for further work are conferred.