CHAPTER 6

CONCLUSIONS AND SUGGESTION
FOR FUTURE WORK

6.1 CONCLUSIONS

In the present work, the performance and emission characteristics of constant speed CIDI engine fuelled with blends of jatropha oil methyl esters (JOME) and fish oil methyl esters (FOME) with diesel were investigated and compared with those of CIDI with diesel fuel. 20% blends of JOME and FOME were observed to be optimum based on NO\textsubscript{x} and soot emission. The EGR quantity was also optimised for NO\textsubscript{x} and soot emissions for 20% JOME and 20% FOME.

As the Partially Premixed Charge Compression Ignition (PPCCI) combustion mode is known to simultaneously reduce the Oxides of Nitrogen and soot, it was taken up for investigation in the present work with optimum blends of JOME and FOME. Control of PPCCI combustion was achieved by varying the premixed ratio (R\textsubscript{p}) and EGR. The effect of Diesel (D-D mode), 20% JOME (D-20J mode) and 20% FOME (D-20F mode) on PPCCI combustion were investigated with and without EGR along with premixed diesel fuel.
The following conclusions are drawn from the present experimental investigation:

1. 20% methyl esters of jatropha and fish oil with 20% EGR are found to be optimum in CIDI mode of operation due to their lower emission characteristics with a marginal decrease in brake thermal efficiency.

2. When operating in PPCCI, premixed ratio of 0.25 and 20% EGR are found to be optimum for all the three modes (D-D, D-20J and D-20F). In D-20J and D-20F modes with 20% EGR, the brake thermal efficiency is lower. NO\textsubscript{x} emissions are marginally higher while UBHC, CO and soot emissions are significantly reduced compared to D-D (Diesel in inlet manifold and in-cylinder injection) mode.

3. Considering the scarcity and cost of petroleum based diesel, indigenously available Jatropha oil and Fish oil can be used to produce methyl esters to reduce the consumption of diesel. D-20F (Diesel in inlet manifold injection–20% FOME injection in cylinder) mode is economical due to lower cost of fish oil methyl esters even though the performance is marginally lower compared to D-20J (Diesel in inlet manifold injection–20% JOME injection in cylinder) mode.

6.2 SUGGESTIONS FOR FUTURE WORK

The following work are suggested for further investigations on the use of biodiesel and its blends in PPCCI mode of operation:
• The effect of variable inlet temperature of premixed fuel on PPCCI mode can be studied. When less volatile fuels are used as premixed fuel they can be heated to prepare the homogeneous mixture. The effect of various volatile fuels (petrol, ethanol and methanol) as premixed fuel in PPCCI combustion mode can be experimented.

• Compression ratio is one of the parameters which has large influence on start of combustion. The effects of variable compression ratio in PPCCI mode can be explored.

• The effect of neat biodiesel in PPCCI mode can be investigated to reduce the dependence on petroleum based fuels.

• The effect of late injection strategies with high pressure in-cylinder injection to prepare the premixed fuel during the compression stroke may be studied.

• Investigations can be carried out in a multi-cylinder automotive diesel engine for better fuel economy and minimum environmental pollution.