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**A PROJECT REPORT ON
“PRODUCTION OF BIO-DIESEL FROM LOW GRADE
USED COOKING OIL”**

Submitted in partial fulfilment of the requirements for the award of

Bachelor of Engineering
IN
MECHANICAL ENGINEERING

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ABSTRACT

Biodiesel is an oxygenated, sulphur free, biodegradable, non-toxic and environmental friendly alternative diesel fuel. Biodiesel can be derived from renewable sources such as vegetable oils, animal fats, restaurant waste oil and frying oil. One of the attractive characteristics of biodiesel is that its use does not require any significant modification to the diesel engine. However, due to its different properties, biodiesel will cause some changes in the engine performances and emission including lower power and higher oxides of nitrogen. Biodiesel is currently expensive but would be more cost effective if it could be produced from low cost feedstock such as animal fats, restaurant waste oil and frying oil. These low cost feedstock are more challenging to process because they content high amount of free fatty acids (FFA).

In the present study, different amounts of methanol (25, 30, 35, 40, 45 and 50%), catalyst concentrations (0.3, 0.5, 0.7, 1.0 and 1.5 gms NaOH), reaction temperature (45, 55 and 60⁰C) and different reaction time (60, 90 and 120 min) were selected for the process of transesterification of restaurant waste oil in order to optimize the experimental conditions for maximum ester (biodiesel) yield. The study was conducted to investigate the characteristic fuel properties of LGUCO, LGUCO methyl esters (biodiesel) and its blend with diesel at different proportions. The viscosity, density, specific gravity, flash point, fire point, pour point, calorific value and carbon residue of LGUCO methyl esters and its blends (B20, B40, B60 and B80) were compared with diesel to study their usefulness as CI engine fuel. This project also involves the study of performance parameters of diesel engine fuelled with LGUCO methyl esters and its blends.

Methyl ester yield (78.4 - 93.2) in the laboratory scale biodiesel reactor was obtained maximum (93.2) at the optimized process parameters such as methanol (40 ml), NaOH (0.3), reaction temperature (55⁰C) and reaction time (90 min).

Keywords: Esters, Biodiesel, Diesel, Diesel engine, free fatty acid (FFA), LGUCO methyl esters, Compression ignition engine (CI engine).