

## **Experimental Investigation, Analysis and Optimization of Performance and Emission Characteristics of Composite Oil Methyl Esters at 160 bar, 180 bar and 200 bar Injection Pressures by Multifunctional Criteria Technique**

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**Abstract :** This study considers the optimization and validation of experimental results using Multi-Functional Criteria Technique (MFCT). MFCT is concerned with structuring and solving decision and planning problems involving multiple variables. Production of biodiesel from Composite Oil Methyl Esters (COME) of Jatropha and Pongamia oils, mixed in various proportions and Biodiesel thus obtained from two step transesterification process were tested for various Physico-Chemical properties and it has been ascertained that they were within limits proposed by ASTM. They were blended with Petrodiesel in various proportions. These Methyl Esters were blended with Petrodiesel in various proportions and coded. These blends were used as fuels in a computerized CI DI engine to investigate Performance and Emission characteristics. From the analysis of results, it was found that 180MEM4B20 blend had the maximum Performance and minimum Emissions. To validate the experimental results, MFCT was used. Characteristics such as Fuel Consumption (FC), Brake Power (BP), Brake Specific Fuel Consumption (BSFC), Brake Thermal Efficiency (BTE), Carbon dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), Hydro Carbon (HC) and Nitrogen oxide (NO<sub>x</sub>) were considered as dependent variables. It was found from the application of this method that the optimized combination of Injection Pressure (IP), Mix and Blend is 178MEM4.2B24. Overall corresponding variation between optimization and experimental results was found to be 7.45%.

**Keywords :** COME, IP, MFCT, optimization, PI, PN, PV

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