### EXPERIMENTAL ANALYSIS OF PERFORMANCE, COMBUSTION AND EMISSION CHARACTERISTICS OF SINGLE CYLINDER DIESEL ENGINE USING BIOFUEL (DIESEL-TURPENTINE BLEND) WITH HYDROGEN INDUCTION

### A PROJECT REPORT

*Submitted by*

**NIROSHINI K 2019502032**

**AKILAN S 2019502509**

**DHINESH BABU R 2019502517**

**HARIVIGNESH N S 2019502523**

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**BONAFIDE CERTIFICATE**

Certified that this project report “**EXPERIMENTAL ANALYSIS OF PERFORMANCE,COMBUSTION AND EMISSION CHARACTERISTICS OF SINGLE CYLINDER DIESEL ENGINE USING BIOFUEL (DIESEL-TURPENTINE BLEND) WITH HYDROGEN INDUCTION”** is the bonafide work of

**NIROSHINI K 2019502032**

**AKILAN S 2019502509**

**DHINESH BABU R 2019502517**

**HARI VIGNESH N S 2019502523**

Who carried out the project work under my supervision. Certified further that to the best of my knowledge, the work reported herein does not form part of any other thesis or laboratory report on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate

|  |  |  |
| --- | --- | --- |
| **SIGNATURE** | **SIGNATURE** |  |
| Dr.A.Sangeet Sahaya Jeyangel | Dr. K. Annamalai |  |
| **SUPERVISOR** | **HEAD OF THE DEPARTMENT** |  |
| Teaching Fellow | Professor |  |
| Department of Automobile Engineering | Department of Automobile Engineering |  |
| Madras Institute of Technology | Madras Institute of Technology |  |

|  |
| --- |
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| We also extend our sincere thanks to all the faculty members of the Automobile Engineering Department, Class, Committee, Chairman and friends who have rendered their valuable who carried out the project work under my supervision. Certified further that to the best of my knowledge, the work reported herein does not form part of any other thesis or laboratory report on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate help in completing this project successfully. |

# **ABSTRACT**

Main aim of the project is to study the influence of hydrogen induction on the performance, combustion and emission characteristics of a compression ignition engine fueled with Turpentine oil biofuel. The work was categorized into two phases. For the phase 1, The Turpentine oil was mixed with diesel in various proportions. Mainly the B20, B30, B40 and B50 blends were taken into account. The test was conducted on a 5.2 kW four stroke, single cylinder diesel engine with compression ratio of 17.5:1. The results obtained are compared with neat diesel fuel at all the loads. The biofuel blends show a significant reduction in the BTE when compared to the diesel fuel. The incylinder pressure and the amount of heat released was also found to be lesser than diesel. The reduction in the CO and NOx emissions was found. But still the smoke and HC emissions were found to be higher than the diesel. The BTE for B20, B30, B40, B50 blends were founded as 31.92%, 31.71%, 31.38%, 30.89%. The HC and CO emissions were 81,83,65,68 ppm and for 0.15%.0.27%,0.21%,0.26% for B20, B30, B40, B50 respectively. It was found that the B20 and B30 blends were promising to have higher BTE and lower emissions so for the phase 2, B20 and B30 blends was taken for further testing with hydrogen induction. The BTE was found to be increased for the blends B20 and B30 while using hydrogen. The BTE for B20 was 33% and B30 was 32% respectively. The hydrogen energy share was 7%. The SFC was also found to be decreased with hydrogen induction. The cylinder pressure and the net heat release rate was found to be increased. The emissions of CO, HC, and smoke was decreased. Only the NOx emissions were increased with hydrogen induction. The NOx at full loads were 2513 ppm and 2678 ppm for B20 and B30 blends.

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