

# CERTIFICATE

This is to certify that the thesis entitled “Development of a Technique to Mitigate NO<sub>x</sub> for an Engine using Bio-diesel as a fuel” submitted by Asfakahemad Abdulmunaf Shekh to The Maharaja Sayajirao University of Baroda, Vadodara, in the Faculty of Technology and Engineering for the award degree of “Doctor of Philosophy” in the Department of Mechanical Engineering is a record of bonafide research work carried out by him. Mr. Asfakahemad Abdulmunaf Shekh has worked under my supervision and guidance and has fulfilled all the requirements for the submission of this thesis. The matter embodied in this thesis has not been submitted in part or full to any other university or institution for the award of any degree.

Guide:

Dr. Nikul K. Patel  
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**Faculty of Technology and Engineering**  
**Department of Mechanical Engineering**

**EXAMINER CERTIFICATE**

(PhD Viva Voce Examination)

This is to certify that I, Dr. Georgy Kurien, have examined the PhD candidate Asfakahemad Abdulmunaf Shekh, bearing registration number FOTE-1074, for the award of the Doctor of Philosophy (PhD) degree in Mechanical Engineering Department, Faculty of Technology and Engineering, The Maharaja Sayajirao University of Baroda. The Viva Voce Examination is conducted on 17/03/2025, where the candidate successfully defended his thesis titled: " Development of a Technique to Mitigate NOx for an Engine using Bio-diesel as a fuel " based on the presentation, discussion, and responses to queries during the viva voce examination, I hereby recommend the award of Doctor of Philosophy (PhD) degree in Mechanical Engineering.

**Dr. Georgy Kurien**  
Professor

Signature: \_\_\_\_\_

Date: 17/03/2025

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Date: 17/03/2025

## Certificate of Anti-Plagiarism

This is to certify that the Ph.D. thesis entitled **“Development of a Technique to Mitigate NOx for an Engine using Bio-diesel as a fuel.”** with Reg. No. FOTE-1074 was processed in the “iThenticate” anti-plagiarism software approved by the Maharaja Sayajirao University of Baroda.

I declare that the similarity report is found to be 9% by applying “iThenticate” software, which comes under the permissible plagiarism notified by the University Grant Commission. This research work has been carried out by **Mr. Asfakahemad Abdulmunaf Shekh** under my supervision at the department of Mechanical Engineering, Faculty of Technology & Engineering, The Maharaja Sayajirao University of Baroda.

Dr. Nikul K Patel

Research Supervisor

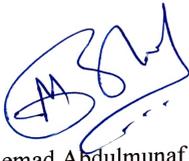
## Declaration

I hereby certify that I am the sole author of this research work and that neither any part of this research work nor the whole of the thesis has been submitted for a degree to any other University or Institution.

I certify that, to the best of my knowledge, my research work does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations, or any other material from the work of other people included in my research work, published or otherwise, is fully acknowledged in accordance with the standard referencing practices.

I declare that this is a true copy of my research work, including final revisions, as approved by my departmental research committee.

Endorsed by:



Asfakahemad Abdulmunaf Shekh  
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