**THESIS TITLE**

**A Dissertation**

*submitted in partial fulfilment of the requirements for the award of the degree of*

**DOCTOR OF PHILOSOPHY**

In

**MECHANICAL ENGINEERING**

by

**Shahrukh**

**Enrolment No. 2023PHAMEC005**

Under the Supervision of:

**Prof Zubair Ah**



**Department of Mechanical Engineering**

**NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR**

**Jammu and Kashmir-190006**

**2024**

**Dedicated**

**to**

**my**

**Family**

**Approval sheet**

This thesis entitled “**xxxxxxxxxxxxxx”** by **“xxxxxxxxxxx”** is approved for the award of the degree of **Doctor in Philosophy**.

**Examiner**

**Supervisor**

**Head of the Department/Chairman**

**Place: NIT Srinagar**

**Date: / /2024**

**Declaration**

I, **Shahrukh**, hereby certify that the work being presented in the thesis entitled “**xxxxxxxxxxxxxxxxxxxxxxxxxxx”** submitted in partial fulfilment of the requirements for the award of Ph.D. in the Department of Mechanical Engineering at National Institute of Technology Srinagar is an authentic record of my original work carried out during the period from **December 2019** to **December 2024** under the supervision of **Prof Zubair Ahmad**. I declare that this written submission represents my ideas in my own words where-in other’s ideas or words have been included, I adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misinterpreted or fabricated or falsified any idea/data/fact/source in my submission. It is further certified that the work presented in this thesis has not been submitted elsewhere for the award of any other degree.

Enrolment No. **2023PHAMEC005** **Shahrukh**

Date: / / 2024 Place:

This is to certify that the above statements made by the candidate are correct to the best of my knowledge.

**Signature of Supervisor**

The PhD viva-voice Examination of **Shahrukh (2023PHAMEC005)** has been held on / /2023 and accepted.

**Signature of External Examiner Signature of H.O. D (Department of Mechanical Engineering)**

**Abstract**

**List of symbols and abbreviations**

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**Acknowledgement**