Physics Informed Neural Network (PINN): A Comprehensive Study of PINN and its Applications

Submitted in partial fulfilment of

Degree of Master of Science (PHYSICS) in the Faculty of *Science & Technology*

By

Mr. AMOGH UJWAL LANJEWAR

Under the supervision of

Dr PRASHANT M GADE

Department of Physics

R.T.M. Nagpur University, Nagpur.

Nagpur-440033

2023 - 24

CERTIFICATE

This is to certify that the project **"Physics Informed Neural Network (PINN): A Comprehensive Study of PINN and its Applications"** documents the participation of **Mr Amogh Ujwal Lanjewar**, under my supervision in the program carried out during the academic year 2023-24, in partial fulfilment of the requirement of the Master of Science in **Physics**, R.T.M. Nagpur University, Nagpur.

Dr Prashant M Gade
Professor,
PGTD of Physics,
RTM Nagpur University,
Nagpur

Date: _____ / _____ / 2023

Place: Nagpur

DECLARATION

I hereby declare that the dissertation entitled **"Physics Informed Neural Network (PINN): A Comprehensive Study of PINN and its Applications."** submitted for the degree of M. Sc. in Physics to the Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur. I have carried it out independently under the supervision of *Dr Prashant M Gade*, Professor, Department of Physics, R.T.M. Nagpur University, Nagpur.

I also declare that the dissertation has not been submitted to any other University or Institute for the award of any other degree, diploma or certificate.

Date: ____ / ____ / 2023

Place: Nagpur

Mr Amogh Ujwal Lanjewar

ACKNOWLEDGEMENT

Undertaking an M.Sc. project is a collaborative effort that draws on the collective support of numerous individuals, both directly and indirectly. I am immensely grateful for the contributions of these individuals who have played a crucial role in the successful completion of this project.

First and foremost, I extend my heartfelt gratitude to my project Guide, Dr Prashant M Gade. His unwavering guidance, invaluable insights, and dedicated support throughout the duration of this project have been instrumental in shaping its outcome. Dr Gade's keen interest and commitment to my research work have been a constant source of inspiration.

I also wish to express my sincere thanks to my fellow research scholars for their valuable advice and continuous moral support. Their diverse perspectives and constructive feedback have enriched this project and contributed to its overall quality.

Finally, I would like to express my deep gratitude to my friends, whose support, whether through direct involvement or indirectly, has been an invaluable source of motivation and encouragement throughout this journey. Their unwavering belief in me and my project has been a driving force behind my efforts.

I am profoundly thankful to each of these individuals for their contributions, and I consider myself fortunate to have had the privilege of working with such a supportive and inspiring network of people during the pursuit of my M.Sc. project.

✶ ✶ ✶

INDEX

✳ ✳ ✳