

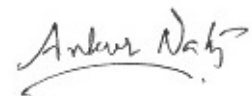
*In Accompanied with the thoughts of my parents*

*Manju Devi and Kusheshwar Nath.*

# Declaration

I certify that

- The work contained in the dissertation is original and has been done by myself under the general supervision of my supervisors.
- The work has not been submitted to any other Institute for any degree or diploma.
- I have followed the guidelines provided by Tezpur University in writing the thesis.
- I have conformed to the norms and guidelines given in the Ethical Code of Conduct of the university.
- Whenever I have used materials (data, theoretical analysis, and text) from other sources, I have given due credit to them by citing them in the text of the dissertation and giving their details in the references.



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**CERTIFICATE**

This is to certify that the thesis entitled “**CP Violation, Mass Hierarchy and Octant Degeneracy in Terrestrial Neutrino Oscillation Experiments**” submitted to Tezpur University in the Department of Physics under the School of Sciences in partial fulfillment of the requirements for the award of the degree of **Doctor of Philosophy in Physics** is a record of original research work carried out by **Mr. Ankur Nath** under my supervision and guidance.

All helps received by him from various sources have been duly acknowledged. No part of this thesis has been submitted elsewhere for award of any other degree.

Signature of Supervisor  
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## Certificate

This is to certify that the thesis entitled “**CP Violation, Mass Hierarchy and Octant Degeneracy in Terrestrial Neutrino Oscillation Experiments**” submitted to Tezpur University in the Department of Physics under the School of Sciences in partial fulfillment of the requirements for the award of the degree of **Doctor of Philosophy in Physics** has been examined by us on ..... and found to be satisfactory.

The Committee recommends for award of the degree of Doctor of Philosophy.

Signature of Principal Supervisor

Signature of External Examiner

# Acknowledgment

*“Kindness is the language the deaf can hear, and the blind can see.”*

- Mark Twain

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**Ankur Nath**

# Glossary of Terms

LEP	Large <b>E</b> lectron <b>P</b> ositron
VEV	Vacuum <b>E</b> xpectation <b>V</b> alue
PMNS	<b>P</b> ontecorvo- <b>M</b> aki- <b>N</b> akagawa- <b>S</b> akata
CP	<b>C</b> harge- <b>P</b> arity
T2K	<b>T</b> okai- <b>T</b> o- <b>K</b> amioka
NO $\nu$ A	<b>Nu</b> MI <b>O</b> ff-axis <b>N</b> eutrino <b>A</b> ppearance
A-LBL	<b>A</b> ccelerator-based <b>L</b> ong <b>B</b> ase <b>L</b> ine
POT	<i>protons-on-target</i>
MH	<b>M</b> ass <b>H</b> ierarchy
PVC	<b>P</b> oly <b>v</b> inyl <b>C</b> hloride
JUNO	<b>J</b> iangmen <b>U</b> nderground <b>N</b> eutrino <b>O</b> bservatory
NPP	<b>N</b> uclear <b>P</b> ower <b>P</b> lant
GW	<b>G</b> iga- <b>W</b> att
R-SBL	<b>R</b> eactor-based <b>S</b> hort <b>B</b> aseline
R-MBL	<b>R</b> eactor-based <b>M</b> edium <b>B</b> aseline
A-LBL	<b>A</b> ccelerator-based <b>L</b> ong <b>B</b> aseline
RENO	<b>R</b> eactor <b>E</b> xperiment for <b>N</b> eutrino <b>O</b> scillation
KamLAND	<b>K</b> amioka <b>L</b> iquid scintillator <b>A</b> nti <b>N</b> eutrino <b>D</b> etector
GLOBES	<b>G</b> eneral <b>L</b> ong <b>B</b> aseline <b>E</b> xperiment <b>S</b> imulator
PSE	<b>P</b> ost <b>S</b> mearing <b>E</b> fficiency
CCQE	<b>C</b> harged <b>C</b> urrent <b>Q</b> uasi- <b>E</b> lastic
NC	<b>N</b> eutral <b>C</b> urrent
MINOS	<b>M</b> ain <b>I</b> njector <b>N</b> eutrino <b>O</b> scillation <b>S</b> earch
SK	<b>S</b> uper- <b>K</b> amiokande

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