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## CERTIFICATE OF THE SUPERVISOR

This is to certify that the thesis entitled "*Frequency Reconfiguration and Beam Scanning of Patch Antenna in C-Band Using PIN Diodes and Microfluidic Channels*", being submitted to Tezpur University in requirement of partial fulfillment for the award of the degree of Doctor of Philosophy in Physics is a record of research work carried out by Mr. Rocktotpal Baruah under my supervision and guidance.

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

(Nidhi S. Bhattacharyya)  
Professor  
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Date:  
Place: Tezpur



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**CERTIFICATE OF THE EXTERNAL EXAMINER AND ODEC**

This is to certify that the thesis entitled "*Frequency Reconfiguration and Beam Scanning of Patch Antenna in C-Band Using PIN Diodes and Microfluidic Channels*", being submitted by Mr. Rocktotpal Baruah to Tezpur University in the **Department of Physics** under the **School of Sciences** in requirement of partial fulfillment 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 the award of the degree of Doctor of Philosophy.

**Supervisor**  
(N. S. Bhattacharyya)

**External Examiner**  
( )

**Date:** \_\_\_\_\_

**Date:** \_\_\_\_\_