DECLARATION

I hereby declare that the thesis entitled "**Development of Biopolymeric Systems for the Controlled Delivery of Anti-Diabetic Agents**," submitted to the Department of Chemical Sciences, Tezpur University, under the School of Sciences, is a record of original research work carried out by me. All sources of support and assistance have been duly acknowledged. I also declare that neither this work as a whole nor any part of it has been submitted to any other University or Institute for any degree, diploma, or award.

Dikshita Sharma

(Dikshita Sharma)

Date: 12/08/2025

Place: Tezpur University, Tezpur

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CERTIFICATE OF THE SUPERVISOR

This is to certify that the thesis entitled ***"Development of Biopolymeric Systems for the Controlled Delivery of Anti-Diabetic Agents",*** submitted to the School of Sciences, Tezpur University, in partial fulfilment for the award of the degree of Doctor of Philosophy in Chemical Sciences, is a record of research work carried out by **Ms. Dikshita Sharma** under my supervision and guidance. She has been duly registered (Registration No. TZU18997 of 2025), and the thesis presented is worthy of consideration for the PhD degree. All help received by her from various sources has been duly acknowledged. No part of this thesis has been submitted elsewhere for the award of any other degree.

Tarun K Maji

Date: 12/08//2025

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(Prof. Tarun K. Maji)

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"My dear Krishna, O infallible one, my illusion is gone. I have regained my memory by Your mercy. I am now firm, free from doubt, and prepared to act according to Your instructions." — Bhagavad Gita.

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Dikshita Sharma

Date: 12/08//2025

Place: Tezpur University, Tezpur

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- **2-NBDG** – 2-(N-(7-nitrobenz-2-oxa-1,3-diazol-4-yl)amino)-2-deoxyglucose
- **ALA** – α-Lipoic Acid
- **AMPK** – AMP-Activated Protein Kinase
- **ANOVA** – Analysis of Variance
- **BSA** – Bovine Serum Albumin
- **CA** – Chitosan-Alginate polyelectrolyte complex
- **CC** – Chitosan-Carrageenan complex
- **DDS** – Drug Delivery System
- **DM** – Diabetes Mellitus
- **DMEM** – Dulbecco's Modified Eagle Medium
- **DMSO** – Dimethyl Sulfoxide
- **EDX** – Energy Dispersive X-Ray Spectroscopy
- **EE** – Encapsulation Efficiency
- **FESEM** – Field Emission Scanning Electron Microscopy
- **FTIR** – Fourier-Transform Infrared Spectroscopy
- **GA** – Glutaraldehyde
- **GC** – Gelatin-Carrageenan complex
- **GDM** – Gestational Diabetes Mellitus
- **GLI** – Gliclazide
- **GLUT** – Glucose Transporter
- **GLUT-4** – Glucose Transporter Type 4
- **HNT** – Halloysite Nanotubes
- **KRP** – Krebs-Ringer Phosphate (buffer)
- **LA** – Lipoic Acid

- **LE** – Loading Efficiency (drug loading efficiency)
- **MMT** – Montmorillonite
- **MO** – Magnesium Oxide (in formulation codes)
- **MgO** – Magnesium Oxide
- **MTT** – 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide
- **NF-κB** – Nuclear Factor kappa B
- **NSAIDs** – Non-Steroidal Anti-Inflammatory Drugs
- **PBS** – Phosphate-Buffered Saline
- **PEC** – Polyelectrolyte Complex
- **PEG** – Polyethylene Glycol
- **PLA** – Polylactic Acid
- **PLGA** – Poly(lactic-co-glycolic) Acid
- **ROS** – Reactive Oxygen Species
- **SAFs** – Soy Protein-Derived Amyloid Fibrils
- **SAS** – Supercritical Antisolvent (technique)
- **SCF** – Supercritical Fluid (as in SCF technology)
- **SDS** – Sodium Dodecyl Sulfate
- **SEM** – Scanning Electron Microscopy
- **SF** – Soy Flour
- **SMEDDS** – Self-Microemulsifying Drug Delivery Systems
- **SPI** – Soy Protein Isolate
- **T1DM** – Type 1 Diabetes Mellitus
- **T2DM** – Type 2 Diabetes Mellitus
- **TEM** – Transmission Electron Microscopy
- **TPP** – Tripolyphosphate (sodium tripolyphosphate)
- **UV-Vis** – Ultraviolet-Visible, As In UV–Vis Spectroscopy
- **XRD** – X-Ray Diffraction