CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE | DELHI NCR | PUNE

Notice for the PhD Viva Voce Examination

Ms Sandra Jestine, Registration Number: 2071501, PhD Scholar at the Department of Mathematics, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Monday, 08 December 2025 at 2.00 pm in Room No. 044, Ground Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis	:	**Study of Rayleigh-Bénard Convection in a Micropolar Fluid Occupying Enclosures**
Discipline	:	**Mathematics**
External Examiner - I	:	**Dr Benerji Babu A** Associate Professor Department of Mathematics National Institute of Technology Warangal - 506004 Telangana
External Examiner - II	:	**Dr Jayalatha G** Professor Department of Mathematics R V College of engineering Bengaluru - 560059 Karnataka
Supervisor	:	**Dr S Pranesh** Professor Department of Mathematics School of Sciences CHRIST (Deemed to be University) Bengaluru - 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva – voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 29 November 2025

ABSTRACT

This thesis presents both linear and non - linear analysis of Rayleigh-Bénard convection (RBC) in a micropolar fluid (MPF) confined within enclosures. The study encompasses shallow ($h < b$), square ($h = b$), and tall ($h > b$) enclosures, where h, is height and b, is breadth of the enclosure. To examine the onset of convection, the Fourier series approach is applied under the framework of linear stability theory to obtain the critical Rayleigh number. In the nonlinear regime, formulations for the average Nusselt and Sherwood numbers are derived to assess the rates of heat and mass transfer. The analysis considers three boundary configurations - free-free, rigid-rigid, and rigid-free. The effect of various MPF parameters has also been analyzed.

Keywords: *Rayleigh-Bénard convection, micropolar fluid, enclosures, Magneto convection, throughflow, double-diffusive convection.*

Publications:

1. **Sandra Jestine**, S Pranesh, "Linear and Non-linear Analysis of Unicellular Rayleigh-Bénard Magneto Convection in a Micropolar Fluid Occupying Enclosures," Advances in Mathematical Modeling and Scientific Computing, Springer Book Series Trends in Mathematics.
2. **Sandra Jestine**, S Pranesh, "Linear and non-linear analysis of Rayleigh-Bénard convection in a micropolar fluid occupying enclosures with realistic boundaries," Communications in Mathematics and Applications.
3. **Sandra Jestine**, S Pranesh, "Effects of throughflow on Rayleigh-Bénard convection in a micropolar fluid occupying enclosures with realistic boundaries," Journal of Applied non-linear dynamics (Accepted).