

**CHRIST**(DEEMED TO BE UNIVERSITY)
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Notice for the PhD Viva Voce Examination

Mr Kumar R, Registration Number: 1981305, PhD Scholar at the Department of Computer Science, School of Sciences, CHRIST (Deemed to be University) will defend his PhD thesis at the public viva-voce examination on Monday, 27 April 2026 at 02.30 pm in Room No. 044, Ground Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis : **Quantum Machine Learning Solution for Investment Portfolio Management**

Discipline : **Computer Science**

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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: 21 April 2026

ABSTRACT

Portfolio construction in modern financial markets is increasingly complex due to nonlinear price dynamics, regime shifts, and diverse investor behavior. The traditional mean–variance framework often fails to capture real market characteristics such as skewness, heavy tails, and time-varying volatility. Moreover, investment decisions are influenced not only by statistical risk but also by behavioral perceptions of gains and losses. To address these limitations, this research proposes an intelligent portfolio management framework integrating multi-period portfolio optimization, quantum-inspired optimization, deep reinforcement learning-based prediction, and behavioral decision modeling. The proposed framework develops a multi-constraint multi-period portfolio optimization (MPO) model that incorporates higher-order statistical moments, including skewness and kurtosis, together with practical investment constraints such as transaction costs, asset weight bounds, and diversification limits. To efficiently solve the resulting non-convex optimization problem, a Quantum-Inspired Whale Optimization Algorithm (QWOA) is introduced to enhance search efficiency and convergence in high-dimensional solution spaces. For predictive intelligence, a hybrid Deep Reinforcement Learning (DRL) model combined with Gated Recurrent Units (GRU) captures temporal dependencies in financial time series and generates adaptive signals for asset allocation. In addition, Cumulative Prospect Theory (CPT) is incorporated to evaluate portfolios based on behavioral utility reflecting loss aversion and probability distortion. The integrated framework enables adaptive portfolio allocation under dynamic market conditions and improves investment decision-making.

Keywords: *Multi-period portfolio optimization, higher-order constraints, quantum whale optimization, market risks, deep reinforcement learning, stock price prediction, portfolio selection, optimal return.*

Publications:

1. **K. Ramaiah** and B. Soundarabai P., “A constrained multi-period portfolio optimization model based on quantum-inspired optimization,” *Multimedia Tools and Applications*, vol. 83, pp. 78769–78796, 2024. doi: 10.1007/s11042-024-18597-y.
2. **K. Ramaiah** and B. Soundarabai P., “An intelligent portfolio management scheme based on hybrid deep reinforcement learning and cumulative prospective approach,” in *Proc. IEEE Int. Conf. Women in Innovation, Technology & Entrepreneurship (ICWITE)*, Bangalore, 2024. doi: 10.1109/ICWITE59797.2024.10503521.
3. **K. Ramaiah** and B. Soundarabai P., “An effective portfolio management system using quantum computing approaches and Markowitz mean-variance optimization model,” in *Proc. 14th Int. Conf. Recent Challenges in Engineering and Technology (ICRCET)*, Apr. 2025.