# PSG COLLEGE OF TECHNOLOGY, COIMBATORE – 641 004 DEPARTMENT OF INFORMATION TECHNOLOGY

**19I720 - PROJECT WORK I**

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**PROJECT TITLE**: Resource Allocation for Enhanced QoS in 5G Networks using Advanced Reinforcement Learning and Graph Neural Networks

**PROJECT GUIDE**: Dr K Anitha Kumari

# ABSTRACT

Efficient resource allocation in 5G networks is crucial for high-quality service delivery, especially for applications with varying bandwidth and low latency needs [1]. This study applies advanced Reinforcement Learning (RL) techniques, such as Q-Learning, Deep Q-Networks (DQN), Policy Gradient Methods, and Actor-Critic Methods, to optimize bandwidth allocation and reduce latency in 5G networks [2]. States are defined by signal strength, latency, required bandwidth, and allocated bandwidth, with actions adjusting bandwidth based on network conditions. Recent RL advancements have shown promise in managing dynamic network conditions and diverse service requirements, enhancing system efficiency and reliability [3]. Integrating RL with Graph Neural Networks (GNNs) allows dynamic, real-time management of bandwidth, frequency spectrum, and computing power, improving decision-making by modelling complex network relationships [5][6]. This project aims to explore AI-driven resource allocation strategies, enhancing Quality of Service (QoS) and offering valuable insights for data scientists and network engineers. This ensures effective resource allocation and optimal performance, contributing to advancements in 5G network management and next-generation wireless communication systems [4]. The reduction in percentage increase from the required bandwidth to the allocated bandwidth and the reduce in latency of the channel is used as a measure of the optimization and is used for result analysis of the system.

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**Signature of the Guide (with date)**