XIAMEN UNIVERSITY MALAYSIA
厦門大學馬來西亞分校

# Research Talk - XMUM

## New Variation of the Cayley Graph for a Finite Cyclic Group

**December 6, 2024 (Friday), 3:00–4:00 pm Room A4#G04**


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Research interests: Graph theory, group theory and beyond.

## Speaker Introduction

Dr. Athirah Zulkarnain earned her PhD from Universiti Teknologi Malaysia, Johor, Malaysia, in 2024. Primary research of Dr. Athirah Zulkarnain focuses on graph theory and group theory, where she developed new variations of graphs associated with groups and explored their properties.

## Abstract


The Cayley graph of a group is constructed based on a given non-empty subset of the group. Many variations of Cayley graphs have been introduced to further explore the geometric structure of the group. Following the introduction of various types of Cayley graphs, numerous applications can be derived from the properties of these graphs, including those related to diameter, chromatic number, and planarity. In this research, the concept of the Cayley graph is extended by introducing a new variation, namely the $p_i$-Cayley graph associated with a group, where $p_i$ denotes the prime number that divides the order of the group. This extension is based on the idea that the order of a finite group can be expressed as a product of powers of prime numbers. The Cayley graph of a group is constructed using a given non-empty subset of the group that satisfies certain properties. In this talk, this new variation of the Cayley graph, the $p_i$-Cayley graph, is constructed using the cyclic group of order $p^n q^n$, where $p$ and $q$ are distinct primes. The construction of the $p_i$-Cayley graph for the cyclic group of this order begins by introducing the definition of the $p_i$-Cayley graph. Next, subsets of the group are identified, each containing elements with prime power orders corresponding to each prime that divides the order of the group. Then, the vertices of the graph are divided into several sets, and the adjacency between vertices within the same sets and across different sets is explored. Based on these adjacencies, the $p_i$-Cayley graph is constructed. The obtained $p_i$-Cayley graph for the cyclic group of order $p^n q^n$ is found to be the union of several copies of complete graphs.