

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**WIENER AND RANDIĆ INDICES OF TWO TYPES OF GRAPHS
ASSOCIATED TO SOME FINITE GROUPS OF ORDER AT
MOST 16**

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ABSTRACT

Topological index is a type of a molecular descriptor that is calculated based on the molecular graph of chemical compound, where molecular graph can be represented as a graph in graph theory. This research is conducted to compute degree and distance-based topological indices of two types of graphs associated to some finite groups of order at most 16. The non-commuting graphs and conjugacy class graphs were first constructed using Maple software. Then, the Wiener index and the Randić index of these graphs were computed using their definitions. This research can help chemists to examine the physical properties of the molecule in an easier and much simpler way without involving any laboratory work. In this research, only two topological indices are considered, which are the Wiener index and the Randić index. A Wiener index of a graph is defined as the sum of the lengths of the paths between all pairs of vertices in the graph. The Randić index is one of the classical graph-based molecular structure descriptors in the field of mathematical chemistry. For the past years, the topological indices of graphs have become an area of interest to many researchers. This research is conducted since there is the lack of connecting molecular graphs with topological indices in graph theory. Hence, this research focuses on finding the topological indices of non-commuting graphs and conjugacy class graphs of the dihedral groups, generalized quaternion groups, and quasi-dihedral groups of order at most 16. Based on the results obtained, it is found that the Wiener index and the Randić index of the non-commuting graphs and the conjugacy class graphs of the dihedral groups, quasi-dihedral groups and generalized quaternion groups increase when the order of groups increases.

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