On Topological Properties Of The Line Graphs Of Certain Chemical Structures

By

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A THESIS SUBMITTED IN THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF THE MASTER OF SCIENCE

IN

MATHEMATICS

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Acknowledgements

First and foremost, I would like to thank **Allah Almighty**, the Supreme power. With-out His will, nothing is possible. May Allah shower His blessings upon His messenger**Hazrat Muhammad (SAW)** who received the first revelation IQRA, meaning Read orRecite.

I would like to thank my supervisor **Dr. Sohail Zafar,** Assistant Professor,University of Management and Technology Lahore, his always exuding positive energynever let me down during my research work. He always responded to my feedback andsuggestions and guided me with great aplomb and grace. He enabled me to analyzemathematical problems from a multi dimensional vision. I greatly benefitted fromhis keen insight for solving seemingly intractable difficulties and put them into simpleterms. I have great respect for his humble attitude. I am fortunate to have the chanceto work with him. I would also like to thank my co-supervisor **Dr. Zohaib Zahid,** Assistant Professor, University of Management and Technology Lahore, for hisgreat abilities in handling mathematical research tools and support my work to runsmoothly. I am also thankful for his advice and his willingnessto share his bright thoughts with me, for shaping up my research.

Finally, I am thankful to my friends and family who have morally and emotionally supported me along the way, especially to my mother,**Shahnaz Saleem** for showing faith in me and phase of my life and my father **Mohammad Saleem** who has been there for me whenever I needed him. I would never be able to pay back the love and affection showered upon me by my parents. I must express my special thanks to **Shoaib Sardar, Iqra Arshad and my hubby Sohail Bashir** for providing me with unfailing support and continuous encouragement throughout the process of research. I also appreciate my children, my little girl **Maida Batool**, my little boy **Umar Sohail** for abiding my ignorance and patience, they showed during my thesis.

RAHEELA SOHAIL

DECLARATION

I ***Raheela Sohail w/o Sohail Bashir*** ID: ***15008109003***. Session 2015– 2017 hereby declare that the matter printed in the thesis titled "**On Topological Properties Of The Line Graphs Of Certain Chemical Structures**" is my own work and has not been printed, published and submitted as research work, thesis or publication in any form in any University, Research institution etc. in Pakistan or Abroad.

Dated: February, 15, 2018 _____

Abstract

Let G = (V (G); E(G)) be a simple connected graph, where V (G) is the set of vertices and E(G) is the set of edges. A topological index of a graph is a num-ber related to a graph which is invariant under graph automorphisms. In this thesis, we give theoretical results for some topological indices such as geometric-arithmetic index GA(G), fth geometric-arithmetic index $GA_5(G)$, atom-bond connectivity index ABC(G), fourth atom-bond connectivity index $ABC_4(G)$, Zagreb indices $M_1(G)$, $M_2(G)$, $M_3(G)$, $M_1(G)$, $\overline{M}_2(G)$, $\overline{Z}$agreb coindices $M_1(\overline{G})$, $M_2(\overline{G})$, $\overline{M_2}(G)$, Randic index R(G), hyper-Zagreb index HM(G), general sum-connectivity index (G) and augumented Zagreb index AZI(G) by considering graph G as a line graph of V phenylenic nanotube, V phenylenic nanotorus, linear pentacene and multiple pentacene.

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RAHILA SOHAIL

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Introduction

Euler (1701-1783) is considered to be the father of graph theory with his work towards the solution of the problems in geometry (see [27, 34, 35]. A graph is a representation of a set of objects where some pairs of objects are connected by links. The interconnected objects are represented by vertices (also called nodes or points) and the set of vertices is denoted by V (G) and is called vertices set. The links that connect some pairs of vertices are called edges (also called arcs or lines) and the set of edges is denoted by E(G) and is called edges set. Let G be a simple graph with vertex set V (G) and edge set E(G).