# Exponential Domination and Bondage Numbers in Some Graceful Cyclic Structure

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**Abstract:** The domination number is an important vulnerability parameter that it has become one of the most widely studied topics in graph theory, and also the bondage number which is related by domination number the most often studied property of vulnerability of communication networks. Recently, Dankelmann et al. defined the exponential domination number denoted by $\gamma_e(G)$ in [17]. In 2016, the exponential bondage number, denoted by $b_{exp}(G)$, is defined by $b_{exp}(G) = min\{|B_e| : B_e \subseteq E(G), \gamma_e(G - B_e) > \gamma_e(G)\}$, where $\gamma_e(G)$ is the exponential domination number of $G$ [24]. In this paper, the above mentioned parameters is has been examined. Then exact formulas are obtained for the families of cyclic structures tend to have graceful subfamilies such as helm graph, windmill graph, circular necklace and friendship graph.

**Keywords:** *graph vulnerability; connectivity; domination number; bondage number; exponential domination number; exponential bondage number.*

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## 1 Introduction

Graph theory plays vital role in various fields. One of the important areas in graph theory is graph labeling. Interest in graph labeling began in mid-1960s with a conjecture by Kotzig-Ringel and a paper by Rosa [5]. In 1967, Rosa published a pioneering paper on graph labeling problems. Graph labeling is powerful tool that makes things ease in various fields of networking. Graph labeling is very important major areas of computer science like data mining image processing, cryptography, software testing, information

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