

ON THE TOTAL k -DOMINATION IN GRAPHS

SERGIO BERMUDO

*Department of Economics
Quantitative Methods and Economic History
Universidad Pablo de Olavide, ES-41013 Seville, Spain
e-mail: sbernav@upo.es*

JUAN C. HERNÁNDEZ-GÓMEZ

AND

JOSÉ M. SIGARRETA

*Faculty of Mathematics
Autonomous University of Guerrero
Carlos E. Adame 5, Col. La Garita, Acapulco, Guerrero, Mexico
e-mail: jcarloshg@gmail.com
josemariasigarretaalmira@hotmail.com*

Abstract

Let $G = (V, E)$ be a graph; a set $S \subseteq V$ is a total k -dominating set if every vertex $v \in V$ has at least k neighbors in S . The total k -domination number $\gamma_{kt}(G)$ is the minimum cardinality among all total k -dominating sets. In this paper we obtain several tight bounds for the total k -domination number of a graph. In particular, we investigate the relationship between the total k -domination number of a graph and the order, the size, the girth, the minimum and maximum degree, the diameter, and other domination parameters of the graph.

Keywords: k -domination, total k -domination, k -tuple domination, k -tuple total domination.

2010 Mathematics Subject Classification: 05C69.

REFERENCES

- [1] S. Bermudo, J.L. Sánchez and J.M. Sigarreta, *Total k -domination in Cartesian product graphs*, Period. Math. Hungar. (2016), to appear.

- [2] S. Bermudo, D.L. Jalemskaya and J.M. Sigarreta, *Total 2-domination in grid graphs*, Util. Math. (2017), to appear.
- [3] E.J. Cockayne and A.G. Thomason, *An upper bound for the k -tuple domination number*, J. Combin. Math. Combin. Comput. **64** (2008) 251–254.
- [4] P. Dorbec, S. Gravier, S. Klavžar and S. Špacapan, *Some results on total domination in direct products of graphs*, Discuss. Math. Graph Theory **26** (2006) 103–112.
doi:10.7151/dmgt.1305
- [5] O. Favaron, M.A. Henning, J. Puech and D. Rautenbach, *On domination and annihilation in graphs with claw-free blocks*, Discrete Math. **231** (2001) 143–151.
doi:10.1016/S0012-365X(00)00313-7
- [6] H. Fernau, J.A. Rodríguez-Velázquez and J.M. Sigarreta, *Global powerful r -alliances and total k -domination in graphs*, Util. Math. **98** (2015) 127–147.
- [7] J. Harant and M.A. Henning, *On double domination in graphs*, Discuss. Math. Graph Theory **25** (2005) 29–34.
doi:10.7151/dmgt.1256
- [8] F. Harary and T.W. Haynes, *Double domination in graphs*, Ars Combin. **55** (2000) 201–213.
- [9] T.W. Haynes, S.T. Hedetniemi and P.J. Slater, *Fundamentals of Domination in Graphs* (Marcel Dekker, Inc., New York, 1998).
- [10] T.W. Haynes, S.T. Hedetniemi and P.J. Slater, *Domination in Graphs: Advanced Topics* (Marcel Dekker, Inc., New York, 1998).
- [11] M.A. Henning, *A survey of selected recent results on total domination in graphs*, Discrete Math. **309** (2009) 32–63.
doi:10.1016/j.disc.2007.12.044
- [12] M.A. Henning and A.P. Kazemi, *k -tuple total domination in graphs*, Discrete Appl. Math. **158** (2010) 1006–1011.
doi:10.1016/j.dam.2010.01.009
- [13] M.A. Henning and A.P. Kazemi, *k -tuple total domination in cross products of graphs*, J. Comb. Optim. **24** (2012) 339–346.
doi:10.1007/s10878-011-9389-z
- [14] M.A. Henning and A. Yeo, *Total Domination in Graphs* (Springer Monographs in Mathematics, 2013).
- [15] A.P. Kazemi, *On the total k -domination number of graphs*, Discuss. Math. Graph Theory **32** (2012) 419–426.
doi:10.7151/dmgt.1616
- [16] A. Klobucar, *Total domination numbers of Cartesian products*, Math. Commun. **9** (2004) 35–44.
- [17] V.R. Kulli, *On n -total domination number in graphs*, Graph theory, Combinatorics, Algorithms, and Applications (San Francisco, CA, 1989), (SIAM, Philadelphia, PA, 1991) 319–324.

Received 21 April 2016
Revised 21 December 2016
Accepted 21 December 2016