

Perfect Codes in Unit Graph of Some Commutative Rings Mohammad Hassan Mudaber¹, Nor Haniza Sarmin² & Ibrahim Gambo³

^{1;2;3} Department of Mathematical Sciences, Faculty of Science,
Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Malaysia_nhs@utm.my

Abstract:

A unit graph of a ring R is a graph with vertex set R and two distinct vertices x and y are adjacent if and only if $x+y$ is a unit of R . A subset C of the vertex set in a graph Γ is called a perfect code if $S_1(c)$ form a partition of the vertex set, when c runs through C . In this paper, we characterize the commutative rings with identity in which their associated unit graphs accept the order 1 and order 2 perfect code. In addition, we prove an order 2 perfect code incomplement unit graph of a ring R having complete bipartite form. Moreover, we prove an order $(p+1)=2$ perfect code in complement unit graph of a division ring of $O(R) = p$, $p \geq 3$ is prime and an infinite order perfect code in complement unit graph of a division ring with $\text{Char}(R) = 0$. We also characterize some of the commutative rings R in which their associated unit graph as well as complement unit graphs do not accept the perfect codes.

Keywords: Commutative Ring, Unit Graph, Complement Unit Graph, Perfect Code