ABSTRACT

REPRESENTATION AND COUNTING THE NUMBER OF LABELLED GRAPHS WITH MAXIMUM ORDER IS FOUR WITHOUT PARALLEL EDGES

A graph G (V, E) is a structure that consists of the set of vertices V; $V \neq \varnothing$ and the set of edges E and a graph G is said to be connected if for every pair of vertices in G, there is a path connecting them. If only every vertex is labeled then the graph is called as graph with vertex labelling, if only every edge is labeled then graph is called as edge labelling; and if both vertices and edges are labeled then the graph is called graph with total labelling. Parallel edges are two edges or more that have the same end points. The aim of this research is to determine the number of labeled graphs without parallel edges and establish a system for $1 \le n \le 4$ and $m \ge 1$. For n=1, the formula is $G(l)_{1,m} = 1$; for n=2, the formula is $G(l)_{2,m} = \binom{2m+1}{1}$; for n=3, the formula is $G(l)_{3,m} = 2\binom{2m-1}{2} + 6m$; and for n=4, the formula is $G(l)_{4,m} = \binom{4m-4}{3} - 15\binom{m-1}{3} + \binom{5m+2}{2} - \binom{m+2}{2} - \binom{7m+1}{1}$.

Keywords: labelling vertex, disconnected graph, connected graph, parallel edges.