Abstract

The study of classical Ramsey numbers $R(m,n)$ shows little progress in the last two decades. Only nine classical Ramsey numbers are known. This difficulty of finding the classical Ramsey numbers has inspired many people to study generalizations of classical Ramsey number. One of them is to determine Ramsey number $R(G,H)$ for general graphs G and H (not necessarily complete).

One of the most general results on graph Ramsey numbers is the establishment of a general lower bound by Chvátal and Harary [17] which is formulated as: $R(G,H) \geq (\chi(H)-1)(c(G)-1)+1$, where G is a graph having no isolated vertices, $\chi(H)$ is the chromatic number of H and $c(G)$ denotes the cardinality of large connected component of G.

Recently, Surahmat and Tomescu [41] studied the Ramsey number of a combination of path P_n versus Jahangir graph $J_{2,m}$. They proved that $R(P_n, J_{2,m}) = n+m-1$ for $m \geq 3$ and $n \geq (4m-1)(m-1)+1$. Furthermore, they determined that $R(P_4, J_{2,2}) = 6$ and $R(P_n, J_{2,2}) = n+1$ for $n \geq 5$.

This dissertation studies the determination of Ramsey number for a combination of path P_n and a wheel-like graph. What we mean by wheel-like graph, is a graph obtained from a wheel by a graph operation such as deletion or subdivision of the spoke edges. The classes of wheel-like graphs which we consider are Jahangir graph, generalized Jahangir graph and beaded wheel. First of all we evaluate the Ramsey number for path P_n with respect to Jahangir graph $J_{2,m}$. We improve the result of Surahmat and Tomescu for $m = 3,4,5$ with $n \geq 2m+1$. Also, we determine the Ramsey number for disjoint union of k identical copies of path P_n versus Jahangir graph $J_{2,m}$ for $m \geq 2$.

Moreover, we determine the Ramsey number of path P_n versus generalized Jahangir graph $J_{s,m}$ for different values of s, m and n. We also, evaluate the Ramsey number for combination of disjoint union of t identical copies of path versus generalized Jahangir graph $J_{s,m}$ for even $s \geq 2$ and $m \geq 3$. At the end, we find the Ramsey number of path versus beaded wheel $BW_{2,m}$, i.e. $R(P_n, BW_{2,m}) = 2n-1$ or $2n$ if $m \geq 3$ is even or odd, respectively, provided $n \geq 2m^2 - 5m + 4$.