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Edge Vertex Prime Labeling of Union of Graphs

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***Abstract:** A graph $G(p,q)$ is said to be an edge vertex prime labeling if its vertices and edges are labeled with distinct positive numbers not exceeding $p+q$ such that for any edge $e=xy$, $f(x)$, $f(y)$ and $f(xy)$ are pairwise relatively prime. We prove that some class of union of graphs such as $p+q$ is even for $G\bigcup K_{1,n}$, $G\bigcup P_n$ and $C_m\bigcup K_{1,n}$, $C_m\bigcup P_n$, $C_n\bigcup C_n$ when $n\equiv 0,2(mod\ 3)$, $K_{2,m}\bigcup C_n$ and one point union of wheel and cycle related graphs are edge vertex prime.*

***Keywords:** edge vertex prime labeling, relatively prime, star, path, cycle, one point union of graphs.*

Mathematics Subject Classification: 05C78

I. INTRODUCTION

Finite, simple and undirected graphs should alone be considered. A graph G is an ordered pair $G=(V,E)$, where $V(G)$ refer a finite set of elements called vertices, while $E(G)$ is a finite set of unordered pairs of vertices called edges. The cardinality of the sets of vertices $V(G)$ and edges $E(G)$ is denoted by $|V(G)|$ and $|E(G)|$ respectively. For all standard notation and terminology in graph theory, Balakrishnan and Ranganathan [1] are followed. A graph of order n is *prime* if one can bijectively label its vertices with positive numbers $1,2,3,\dots,n$, so that any two adjacent vertices are relatively prime. Tout, Dobboucy, Howalla [10], first introduced a first kind of graph labeling called prime labeling and later developed by Roger Entriger. There are several types of labeling for a dynamic survey of various graph labeling problems with extensive bibliography we refer to Gallian [2]. Let $G_1=(V_1,E_1)$ and $G_2=(V_2,E_2)$ be two simple graphs. The graph $G=(V(G),\ E(G))$, where $V=V_1\bigcup V_2$ and $E=E_1\bigcup E_2$, is called the *union of* G_1 *and* G_2 is denoted by $G_1\bigcup G_2$. For $n\geq 2$, an $n-path$ or simply *path* is denoted P_n, is a connected graph consisting of two vertices, with degree 1 and $n-2$ vertices of degree 2. For $n\geq 3$, an n-*Cycle* or Simply *cycle*, denoted C_n, is a connected graph consisting of n vertices, each of degree 2. Note that both P_n and C_n have n vertices while P_n has $n-1$ edges and C_n has n edges. An $n-star$ or simply *star*, denoted S_n, is a graph consisting of one vertex of degree n, called the *centre* and n vertices of degree 1. Note that S_n consists of $n+1$ vertices and *n* edges. The graph W_n^m obtained from *m* copies of W_n by identifying their center. Prime labeling is a variant of an edge vertex prime labeling. An edge vertex prime labeling starts with the definion of a bijective function $f:V(G)\bigcup E(G)\rightarrow\{1,2,3,\dots,|V(G)\bigcup E(G)|\}$ is an edge *vertex prime labeling* if for any edge $uv\in E(G)$, we have

$$gcd(f(u),f(v))=gcd(f(u),f(uv))=gcd(f(v),f(uv))=1$$

. A graph G which admits an edge vertex prime labeling is called an *edge vertex prime graph*. Jagadesh and Baskar Babujee [3] originated the concept of an edge vertex prime labeling the existence of the same paths, cycles and star $K_{1,n}$ are proved by them. In [4], they also proved that an edge vertex prime graph for some class of graphs such as generalized star, generalized cycle star, $p+q$ is even for $G\hat{O}K_{1,n}$, $G\hat{O}P_n$, $G\hat{O}C_n$. An edge vertex prime graph of wheel graph, fan graph, friendship graph is Parmer [5] investigated. An edge vertex prime graph can be [6] determined that $K_{2,n}$, for every n and $K_{3,n}$ for $n=\{3,4,\dots,29\}$.

In [7], we proved that triangular and rectangular book, butterfly graph with shell, Drums D_n, Jahangir $J_{n,3}$, and $J_{n,4}$ are an edge vertex prime graphs. Also in [8], double star $B_{m,n}$, subdivision of $B_{m,n}$ and $K_{1,n}$, comb graph, spider, H-graph of path P_n and coconut tree are an edge vertex prime graph are determined by us. Some class of graphs such as $p+q$ is odd for $G\hat{O}W_n$, $G\hat{O}f_n$, $G\hat{O}F_n$, $p+q$ is even for $G\hat{O}P_n$, $C_l\hat{O}K_{1,m}\hat{O}P_n$, Umbrella graph $U(m,n)$, crown graph, union of cycles for $C_n\bigcup C_n\cup C_n$ $n\equiv 0(mod\ 3)$, $C_n\cup C_n\cup C_n\cup\dots\cup C_n$, $n\equiv 0(mod\ 5)$ are an edge vertex prime graph.

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In section 2. An edge vertex prime is an investigation of union of some graphs $p+q$ is even for $G\cup K_{1,n}$, $G\cup P_n$, and $C_m\cup K_{1,n}$, $C_m\cup P_n$, $C_n\cup C_n$ when $n\equiv 0,2(mod\ 3)$, $K_{2,m}\cup C_n$ when m is even, $n\equiv 0(mod\ 3)$ and m is odd $n\equiv 0,1(mod\ 3)$.

In section 3, finalise that one point union of graphs such as W_n^m, n is even and $n=3,5,7,9$ and cycle C_n^m, $n=3,4,5,6,7,9,11$ are an edge vertex prime.

II. UNION OF GRAPHS

We have proved some union of graphs are edge vertex prime in the section below.

Theorem 2.1 If $G(p,q)$ has an edge vertex prime graph with $p+q$ is even, then there exists a graph from the class $G\cup K_{1,n}, n\geq 1$ that admits an edge vertex prime graph.

Proof. Let $G(p,q)$ be an edge vertex prime graph when $p+q$ is even, with bijective function $f: V(G)\cup E(G)\to\{1,2,\ldots,p+q\}$ with property that given any edge $uv\in E(G)$, the numbers $f(u), f(v)$ and $f(uv)$ are pairwise relatively prime. Consider the graph $K_{1,n}$ with vertex set $\{u,v_i: 1\leq i\leq n\}$ and edge set $\{uv_i: 1\leq i\leq n\}$. We define a new graph $G_1=G\cup K_{1,n}$ with vertex set $V_1=V(G)\cup\{u,v_i: 1\leq i\leq n\}$ and edge set $E_1=E\cup\{uv_i: 1\leq i\leq n\}$. Define a bijective function $g: V_1\cup E_1\to\{1,2,3,\ldots,p+q,p+q+1,\ldots,p+q+2n+1\}$ by $g(v)=f(v)$, for all $v\in V(G)$ and $g(uv)=f(uv)$ for all $uv\in E(G)$, $g(u)=p$, where p is choose the largest prime number in the set $\{p+q+1,p+q+2,\ldots,p+q+2n+1\}$ and label the edge set $\{uv_i: 1\leq i\leq n\}$ by remaining even labels and label the vertex set $\{v_i: 1\leq i\leq n\}$ by the remaining odd labels. To analyse that G_1 is an edge vertex prime graph. Earlier, G is an edge vertex prime graph, it is possible to prove that for any edge $uv\in E_1$, which is not in G, the numbers $g(u)$, $g(v)$ and $g(uv)$ are pairwise relatively prime. It is easily proved that, for any edge $uv\in E_1$, $gcd(g(u),g(v))=1$, $gcd(g(u),g(uv))=1$, $gcd(g(v),g(uv))=1$. Hence $G_1=G\cup K_{1,n}, n\geq 1$ is an edge vertex prime graph.

Theorem 2.2 If $G(p,q)$ has an edge vertex prime graph with $p+q$ is even, then there exists a graph from the class $G\cup P_n$ that admits an edge vertex prime graph.

Proof. Let $G(p,q)$ be an edge vertex prime labeling graph when $p+q$ is even, with bijective function $f: V(G)\cup E(G)\to\{1,2,\ldots,p+q\}$ with property that given any edge $uv\in E(G)$, the numbers $f(u), f(v)$ and $f(uv)$ are pairwise relatively prime. Consider the graph P_n with vertex set $\{u_i: 1\leq i\leq n\}$ and edge set $\{u_iu_{i+1}: 1\leq i\leq n-1\}$. We define a new graph $G_1=G\cup P_n$ with vertex set $V_1=V\cup\{u_i: 1\leq i\leq n\}$ and $E_1=E\cup\{u_iu_{i+1}: 1\leq i\leq n-1\}$. Define a bijective function $g: V_1\cup E_1\to\{1,2,3,\ldots,p+q,p+q+1,\ldots,p+q+2n-1\}$ by $g(v)=f(v)$ for all $v\in V(G)$ and $g(uv)=f(uv)$ for all $uv\in E(G)$, $g(u_i)=p+q-1+2i$ for $1\leq i\leq n$, $g(u_iu_{i+1})=p+q+2i$ for $1\leq i\leq n-1$. We have to prove that G_1 is an edge vertex prime labeling. Earlier, G is an edge vertex prime labeling, it is enough to prove that for any edge $uv\in E_1$, which is not in G, the numbers $g(u)$, $g(v)$ and $g(uv)$ are pairwise relatively prime. Label the vertices and edges of path P_n is consecutive positive numbers. It is easily verified that, for any edge $\in E_1$, $gcd(g(u),g(v))=1$, $gcd(g(u),g(uv))=1$, $gcd(g(v),g(uv))=1$. So $G_1=G\cup P_n$ is an edge vertex prime graph.

Theorem 2.3 The disconnected graph $C_m\cup K_{1,n}, m\geq 3$ is an edge vertex prime graph.

Proof. Consider the disconnected graph $G=C_m\cup K_{1,n}$. Let $V(C_m)=\{v_i: 1\leq i\leq m\}$ and $V(K_{1,n})=\{u,u_i: 1\leq i\leq n\}$, where u is the centre of $K_{1,n}$, $E(C_m)=\{v_1v_m, v_iv_{i+1}: 1\leq i\leq m-1\}$, $E(K_{1,n})=\{uu_i: 1\leq i\leq n\}$, Also, $|V(G)|=m+n+1$ and $|E(G)|=m+n$. Define a bijective function $f: V(G)\cup E(G)\to\{1,2,\ldots,2m+2n+1\}$, by $f(u)=1$, $f(u_i)=2i+1$ for $1\leq i\leq n$, $f(uu_i)=2i$ for $1\leq i\leq n$, $f(v_1)=2m+2n+1$, $f(v_i)=2n+2i-1$ for $2\leq i\leq m$, $f(v_iv_{i+1})=2n+2i$ for $1\leq i\leq m-1$, $f(v_1v_m)=2m+2n$.

Next, we show that the property of an edge vertex prime graph.

For any $1 \le i \le n$,

$gcd(f(u), f(u_i)) = gcd(1, 2i+1) = 1$,

$gcd(f(u), f(uu_i)) = gcd(1, 2i) = 1$,

$gcd(f(u_i), f(uu_i)) = gcd(2i+1, 2i) = 1$, since they are consecutive positive numbers. For any $2 \le i \le n$,

$gcd(f(v_i), f(v_{i+1})) = gcd(2n+2i-1, 2n+2i+1) = 1$,

$gcd(f(v_i), f(v_i v_{i+1})) = gcd(2n+2i-1, 2n+2i) = 1$,

$gcd(f(v_{i+1}), f(v_i v_{i+1})) = gcd(2n+2i+1, 2n+2i) = 1$,

$gcd(f(v_1), f(v_2)) = gcd(2m+2n+1, 2n+3) = 1$,

$gcd(f(v_1), f(v_1 v_2)) = gcd(2m+2n+1, 2n+2) = 1$,

$gcd(f(v_2), f(v_1 v_2)) = gcd(2n+3, 2n+2) = 1$,

$gcd(f(v_1), f(v_m) = gcd(2m+2n+1, 2m+2n-1) = 1$,

$gcd(f(v_1), f(v_1 v_m)) = gcd(2m+2n+1, 2m+2n) = 1$,

$gcd(f(v_m), f(v_1 v_m)) = gcd(2m+2n-1, 2m+2n) = 1$.

Therefore, for any edge $\in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence $G = C_m \cup K_{1,n}, m \ge 3$ admits an edge vertex prime graph.

Theorem 2.4 The disconnected graph $C_m \cup P_n, m \ge 3$ is an edge vertex prime graph.

Proof. Let $u_1, u_2, \dots, u_m$ be the vertices of cycle C_m and $v_1, v_2, \dots, v_n$ be the vertices of path P_n. Consider $G = C_m \cup P_n$ be a graph. Then $V(G) = (u_i, v_j : 1 \le i \le m \;,\; 1 \le j \le n\}$ and $E(G) = \{u_1 u_m, u_i u_{i+1} : 1 \le i \le m-1\} \cup \{v_j v_{j+1} : 1 \le i \le n-1\}$.

Here, $|V(G)| = m+n$ and $|E(G)| = m+n-1$. Define a bijective function $f: V(G) \cup E(G) \to \{1, 2, \dots, 2m+2n-1\}$ by $f(u_i) = 2i-1$ for $1 \le i \le m$, $f(u_i u_{i+1}) = 2i$ for $1 \le i \le m-1$, $f(u_1 u_m) = 2m$, $f(v_j) = 2m+2j-1$ for $1 \le j \le n$, $f(v_j v_{j+1}) = 2m+2j$ for $1 \le j \le n-1$.

Next, we prove the property of an edge vertex prime graph.

For any edge $u_i u_{i+1} \in E(G)$,

$gcd(f(u_i), f(u_{i+1})) = gcd(2i-1, 2i+1) = 1$,

$gcd(f(u_i), f(u_i u_{i+1})) = gcd(2i-1, 2i) = 1$,

$gcd(f(u_{i+1}), f(u_i u_{i+1})) = gcd(2i+1, 2i) = 1$.

For any $u_1 u_m \in E(G)$,

$gcd(f(u_1), f(u_m)) = gcd(1, 2m-1) = 1$,

$gcd(f(u_1), f(u_1 u_m)) = gcd(1, 2m) = 1$,

$gcd(f(u_m), f(u_1 u_m)) = gcd(2m-1, 2m) = 1$.

Similarly, the other edges are pairwise relatively prime. Therefore, for any edge $uv \in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence $C_m \cup P_n$, $m \ge 3$ has an edge vertex prime graph.

Theorem 2.5 The disconnected graph $C_n \cup C_n$, $n \ge 3$ admits an edge vertex prime graph, where $n \equiv 0, 2 (mod\ 3)$.

Proof. Let $G = C_n \cup C_n$ be a graph. Then $V(G) = \{v_i : 1 \le i \le 2n\}$ and $E(G) = \{v_i v_{i+1} : 1 \le i \le n-1\} \cup \{v_1 v_n\} \cup \{v_i v_{i+1} : n+1 \le i \le 2n-1\} \cup \{v_{n+1} v_{2n}\}$.

Also, $|V(G)| = 2n$ and $|E(G)| = 2n$. Define a bijective function $f: V(G) \cup E(G) \to \{1, 2, \dots, 4n\}$ by $f(v_i) = 2i-1$ for $1 \le i \le 2n$, $f(v_i v_{i+1}) = 2i$ for $1 \le i \le n-1$, $f(v_1 v_n) = 2n$, $f(v_{n+1} v_{2n}) = 4n$, $f(v_i v_{i+1}) = 2i$ for $n+1 \le i \le 2n-1$. Clearly, for any edge $uv \in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence $G = C_n \cup C_n, n \ge 3$ is an edge vertex prime graph, where $n \equiv 0, 2 (mod\ 3)$.

Theorem 2.6 The graph obtained by the duplication of vertex v_2 in path P_n or cycle C_n is an edge vertex prime graph.

Proof. Let G' be the graph obtained by duplicating a vertex v_2 of degree 2 in P_n. Let v_2' be the duplication of v_2 in G'. Then $V(G') = \{v_2', v_i : 1 \le i \le n\}$ and $E(G') = \{v_i v_{i+1} : 1 \le i \le n-1\} \cup \{v_1 v_2'\} \cup \{v_3 v_2'\}$.

Here, $|V(G')| = n + 1$ and $|E(G')| = n + 1$. Define a bijective labeling $f: V(G') \cup E(G') \to \{1,2,\dots,2n+2\}$ by $f(v_i) = 2i - 1$ for $1 \le i \le n$, $f(v_i v_{i+1}) = 2i$ for $1 \le i \le n-1$, $f(v_2') = 2n+1, f(v_1 v_2') = 2n$, $f(v_3 v_2') = 2n+2$.

Next, we show that the property of an edge vertex prime graph.

For any $1 \le i \le n-1$,

$gcd(f(v_i), f(v_{i+1})) = gcd(2i-1, 2i+1) = 1$,
$gcd(f(v_i), f(v_i v_{i+1})) = gcd(2i-1, 2i) = 1$,
$gcd(f(v_{i+1}), f(v_i v_{i+1})) = gcd(2i+1, 2i) = 1$,
$gcd(f(v_1), f(v_2')) = gcd(1, 2n+1) = 1$,
$gcd(f(v_1), f(v_1 v_2')) = gcd(1, 2n) = 1$,
$gcd(f(v_2'), f(v_1 v_2')) = gcd(2n+1, 2n) = 1$,
$gcd(f(v_3), f(v_2')) = gcd(5, 2n+1) = 1$,
$gcd(f(v_3), f(v_3 v_2')) = gcd(5, 2n+2) = 1$,
$gcd(f(v_2'), f(v_3 v_2')) = gcd(2n+1, 2n+2) = 1$.

Therefore, for any edge $\in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence the graph G' is duplicating a vertex v_2 in P_n has an edge vertex prime labeling.

Let G'' be the graph obtained by duplication of v_2 of degree 2 in C_n. Let v_2'' be the duplication of v_2 in G''. Then $V(G'') = \{v_2'', v_i : 1 \le i \le n\}$, and $E(G'') = \{v_i v_{i+1} : 1 \le i \le n - 1\} \cup \{v_1 v_n\} \cup \{v_1 v_2''\} \cup \{v_3 v_2''\}$.

Here, $V(G'') = n + 1$ and $E(G'') = n + 2$. Define a bijective labeling $f: V(G'') \cup E(G'') \to \{1,2,\dots,2n+3\}$ by $f(v_i) = 2i - 1$ for $1 \le i \le n$, $f(v_i v_{i+1}) = 2i$ for $1 \le i \le n-1$, $f(v_1 v_n) = 2n$, $f(v_2'') = 2n+2$, $f(v_1 v_2'') = 2n+1, f(v_3 v_2'') = 2n+3$. Clearly, for any edge $uv \in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence the graph G'' is duplication of v_2 in C_n has an edge vertex prime graph.

Theorem 2.7 The disconnected graph $K_{2,m} \cup C_n$, $(n \ge 3, n \equiv 0 (mod\ 3), m\ is\ even)$ is an edge vertex prime graph.

Proof. Consider the disconnected graph $G = K_{2,m} \cup C_n$, $(n \ge 3, n \equiv 0 (mod\ 3), m\ is\ even)$. Let $V(K_{2,m}) = \{u_1, u_2\} \cup \{v_i : 1 \le i \le m\}$, $V(C_n) = \{w_i : 1 \le i \le n\}$ and $E(K_{2,m}) = \{u_1 v_i, u_2 v_i : 1 \le i \le m\}$, $E(C_n) = \{w_1 w_n, w_i w_{i+1} : 1 \le i \le n-1\}$. Also, $|V(G)| = m + n + 2$ and $|E(G)| = 2m + n$. Define a bijective function $f: V(G) \cup E(G) \to \{1,2,\dots,3m+2n+2\}$ as follows. First, consider $K_{2,m}$, we use (Parmer [6] proved that the same technique $K_{2,m}$ is an edge vertex prime graph for all *m* in theorem 2.1). Next, consider C_n, $f(w_i) = 3m + 2i + 1$ for $1 \le i \le n$ $f(w_i w_{i+1}) = 3m + 2i + 2$ for $1 \le i \le n-1$. Clearly, for any edge $uv \in E(G)$, the numbers $f(u), f(v)$ and $f(uv)$ are pairwise relatively prime. Hence $G = K_{2,m} \cup C_n$, $(n \ge 3, n \equiv 0 (mod\ 3), m\ is\ even)$ admits an edge vertex prime graph.

Theorem 2.8 The disconnected graph $K_{2,m} \cup C_n$, $(n \ge 3, n \equiv 0, 1 (mod\ 3), m\ is\ odd)$ is an edge vertex prime graph.

Proof. Similar to the even case, above theorem 2.7, only changes in first cycle, we stated the lowest label by an edge. $f(w_i) = 3m + 2i$ for $2 \le i \le n$, $f(w_1) = 3m + 2n + 2$, $f(w_i w_{i+1}) = 3m + 2i + 1$ for $1 \le i \le n-1$, $f(w_1 w_n) = 3m + 2i + 1$. It is easily verified that, for any edge $uv \in E(G)$, the numbers $f(u), f(v)$ and $f(uv)$ are pairwise relatively prime.

Hence $G = K_{2,m} \cup C_n$, $(n \ge 3, n \equiv 0,1 (mod\ 3), m\ is\ even)$ admits an edge vertex prime graph.

III. ONE POINT UNION OF GRAPHS

In this section, we investigate one point union of some graphs are an edge vertex prime.

Theorem 3.1 One point union of m copies W_n, that is, W_n^m (*n* is even, except $n = 10n - 6, 10n - 2, m \ge 1\ and\ n \ge 1$) is an edge vertex prime graph.

Proof. Let $G = W_n^m$ be a graph. Then $V(G) = \{v, v_{ij} : 1 \le i \le m, 1 \le j \le n\}$ and $E(G) = \{v v_{ij} : 1 \le i \le m, 1 \le j \le n\} \cup \{v_{ij} v_{ij+1} : 1 \le i \le m, 1 \le j \le n-1\} \cup \{v_{i1} v_{in} : 1 \le i \le m\}$. Also, $|V(G)| = mn + 1$ and $|E(G)| = 2mn$. Define a bijective function $f: V(G) \cup E(G) \to \{1,2,\dots,3mn+1\}$ by $f(v) = 1$,

$$f(v_{ij}) = \begin{cases} 3n(i-1)+3j; & j = 1,3,5,\dots,n-1 \\ 3n(i-1)+3j-1; & j = 2,4,6,\dots,n \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 3n(i-1)+3j-1; & j = 1,3,5,\dots,n-1 \\ 3n(i-1)+3j; & j = 2,4,6,\dots,n \end{cases}$$

$f(v_{ij}v_{ij+1}) = 3n(i-1)+3j+1,\ \ j = 1,3,5,\dots,n-1$

,

$$f(v_{i1}v_{ij}) = 3n(i-1)+3j+1,\ \ j = n.$$

It is easily verified that, for any edge $uv \in E(G)$, $gcd\big(f(u),f(v)\big) = 1$, $gcd\big(f(u),f(uv)\big) = 1$, $gcd\big(f(v),f(uv)\big) = 1$. Hence $G = W_n^m$ (n is even, except $n = 10n-6, 10n-2, m \geq 1\ and\ n \geq 1$) admits an edge vertex prime graph.

Theorem 3.2 One point union of W_{10n-6}^m, $m \geq 1\ and\ n \geq 1$ is an edge vertex prime graph.

Proof. Let $G = W_{10n-6}^m$ be a graph. Then $V(G) = \{v, v_{ij} : 1 \leq i \leq m, 1 \leq j \leq 10n-6\}$

and

$E(G) = \{vv_{ij} : 1 \leq i \leq m, 1 \leq j \leq 10n-6\} \cup \{v_{ij}v_{ij+1} : 1 \leq i \leq m,\ 1 \leq j \leq 10n-7\} \cup \{v_{i1}v_{i(10n-6)} : 1 \leq i \leq m\}$. Also, $|V(G)| = m(10n-6)+1$ and $|E(G)| = 2m(10n-6)$. Define a bijective function $f : V(G) \cup E(G) \to \{1,2,\dots,3m(10n-6)+1\}$ by $f(v) = 1$,

$$f(v_{ij}) = \begin{cases} 3(10n-6)(i-1)+3j; & j = 1,3,5,\dots,10n-7 \\ 3(10n-6)(i-1)+3j-1; & j = 2,4,6,\dots,10n-6 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 3(10n-6)(i-1)+3j-1; & j = 1,3,5,\dots,10n-7 \\ 3(10n-6)(i-1)+3j; & j = 2,4,6,\dots,10n-6 \end{cases}$$

Consider the following cases.

Case 1. $m \not\equiv 2(mod\ 5)$

$f(v_{ij}v_{ij+1}) = 3(10n-6)(i-1)+3j+1,\ \ j = 1,2,3,\dots,10n-7$

,

$f(v_{i1}v_{ij}) = 3(10n-6)(i-1)+3j+1,\ \ j = 10n-6$

Case 2. $m \equiv 2(mod\ 5)$

$$f(v_{ij}v_{ij+1}) = \begin{cases} 3(10n-6)(i-1)+3j+1; & j = 1,2,3,\dots,10n-8 \\ 3(10n-6)(i-1)+3(j+1)+1; & j = 10n-7 \end{cases}$$

$f(v_{i1}v_{ij}) = 3(10n-6)(i-1)+3(j-1)+1,\ \ j = 10n-6$

.

Clearly, for any edge $uv \in E(G)$, $gcd\big(f(u),f(v)\big) = 1$, $gcd\big(f(u),f(uv)\big) = 1$, $gcd\big(f(v),f(uv)\big) = 1$. Hence $G = W_{10n-6}^m$, $m \geq 1\ and\ n \geq 1$ admits an edge vertex prime.

Theorem 3.3 One point union of W_{10n-2}^m, $m \geq 1\ and\ n \geq 1$ is an edge vertex prime graph.

Proof. Let $G = W_{10n-2}^m$ be a graph. Then

$V(G) = \{v, v_{ij} : 1 \leq i \leq m, 1 \leq j \leq 10n-2\}$ and $E(G) = \{vv_{ij} : 1 \leq i \leq m, 1 \leq j \leq 10n-2\} \cup \{v_{ij}v_{ij+1} : 1 \leq i \leq m, 1 \leq j \leq 10n-3\} \cup \{v_{i1}v_{i(10n-2)} : 1 \leq i \leq m\}$. Also, $|V(G)| = m(10n-2)+1$ and $|E(G)| = 2m(10n-2)$.

Define a bijective function $f : V(G) \cup E(G) \to \{1,2,\dots,3m(10n-2)+1\}$ by $f(v) = 1$,

$$f(v_{ij}) = \begin{cases} 3(10n-2)(i-1)+3j; & j = 1,3,5,\dots,10n-3 \\ 3(10n-2)(i-1)+3j-1; & j = 2,4,6,\dots,10n-4 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 3(10n-2)(i-1)+3j-1; & j = 1,3,5,\dots,10n-3 \\ 3(10n-2)(i-1)+3j; & j = 2,4,6,\dots,10n-2 \end{cases}$$

$f(v_{i(10n-2)}) = 3(10n-2)(i-1)+3j+1,\ \ j = 10n-2$

Consider the following cases.

Case 1. $m \not\equiv 4(mod\ 5)$

$f(v_{ij}v_{ij+1}) = 3(10n-2)(i-1)+3j+1,\ \ j = 1,2,3,\dots,10n-3$

,

$f(v_{i1}v_{ij}) = 3(10n-2)(i-1)+3j+1,\ \ j = 10n-2$

Case 2. $m \equiv 4(mod\ 5)$

$$f(v_{ij}v_{ij+1}) = \begin{cases} 3(10n-2)(i-1)+3j+1; & j = 1,2,3,\dots,10n-4 \\ 3(10n-2)(i-1)+3(j+1)-1; & j = 2,4,6,\dots,10n-3 \end{cases}$$

$f(v_{i1}v_{ij}) = 3(10n-2)(i-1)+3(j-1)+1,\ \ j = 10n-2$

.

Clearly, for any edge $uv \in E(G)$, $gcd(f(u),f(v)) = 1$, $gcd(f(u),f(uv)) = 1$, $gcd(f(v),f(uv)) = 1$. Hence $G = W_{10n-2}^{m}$ $m \geq 1\ and\ n \geq 1$ admits an edge vertex prime graph.

Theorem 3.4 One point union of *m* copies W_3 is an edge vertex prime graph.

Proof. Let $G = W_3^m$ be a graph. Then $V(G) = \{v, v_{ij}: 1 \leq i \leq m, 1 \leq j \leq 3\}$ and $E(G) = \{vv_{ij}: 1 \leq i \leq m, 1 \leq j \leq 3\} \cup \{v_{ij}v_{ij+1}: 1 \leq i \leq m, 1 \leq j \leq 2\} \cup \{v_{i1}v_{i3}: 1 \leq i \leq m\}$

. Also, $|V(G)| = 3m+1$ and $|E(G)| = 6m$.

Define a bijective function $f: V(G) \cup E(G) \to \{1,2,\dots,9m+1\}$ by $f(v) = 1$. Consider i^{th} copy of the following cases.

Case 1. Even number of copies, that is, $i = 2,4,6,\dots$

$$f(v_{ij}) = \begin{cases} 9(i-1)+3j-1; & j = 1,3 \\ 9(i-1)+3j & j = 2 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 9(i-1)+3j; & j = 1,3 \\ 9(i-1)+3j-1; & j = 2 \end{cases}$$

$f(v_{ij}v_{ij+1}) = 9(i-1)+3j+1,\ \ j = 1,2$

$f(v_{i1}v_{ij}) = 9(i-1)+3j+1,\ \ j = 3.$

Case 2. Odd number of copies, that is, $i = 1,3,5,\dots$

$$f(v_{ij}) = \begin{cases} 9(i-1+3j;); & j = 1 \\ 9(i-1)+3j-1; & j = 2 \\ 9(i-1)+3j-2; & j = 3 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 9(i-1)+3j-1; & j = 1,3 \\ 9(i-1)+3j & j = 2 \end{cases}$$

$$f(v_{ij}v_{ij+1}) = \begin{cases} 9(i-1)+3j+1; & j = 1,2, \\ 9(i-1)+3(j+1); & j = 2 \end{cases}$$

$f(v_{i1}v_{ij}) = 9(i-1)+3j+1,\ \ j = 3.$

It is easily verified , for any edge $uv \in E(G)$, the numbers $f(u)$, $f(v)$ and $f(uv)$ are pairwise relatively prime. Hence $G = W_3^m$ admits an edge vertex prime graph.

Theorem 3.5 One point union of *m* copies W_5 is an edge vertex prime graph.

Proof. Let $G = W_5^m$ be a graph. Then $V(G) = \{v, v_{ij}: 1 \leq i \leq m, 1 \leq j \leq 5\}$ and $E(G) = \{vv_{ij}: 1 \leq i \leq m, 1 \leq j \leq 5\} \cup \{v_{ij}v_{ij+1}: 1 \leq i \leq m, 1 \leq j \leq 4\} \cup \{v_{i1}v_{i5}: 1 \leq i \leq m\}$

. Also, $|V(G)| = 5m+1$ and $|E(G)| = 10m$.

Define a bijective function $f: V(G) \cup E(G) \to \{1,2,\dots,15m+1\}$ by $f(v) = 1$. Consider i^{th} copy of the following cases.

Case 1. Even number of copies, that is, $i = 2,4,6,\dots$

$$f(v_{ij}) = \begin{cases} 15(i-1)+3j-1; & j = 1,3,5 \\ 15(i-1)+3j & j = 2,4 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 15(i-1)+3j; & j = 1,3,5 \\ 15(i-1)+3j-1; & j = 2,4 \end{cases}$$

$f(v_{ij}v_{ij+1}) = 15(i-1)+3j+1,\ \ j = 1,2,3,4.$

$f(v_{i1}v_{ij}) = 15(i-1)+3j+1,\ \ j = 5.$

Case 2. Odd number of copies, that is, $i = 1,3,5,\dots$

$$f(v_{ij}) = \begin{cases} 15(i-1+3j;) & j = 1,3 \\ 15(i-1)+3j-1; & j = 2,4 \\ 15(i-1)+3j-2; & j = 5 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 15(i-1)+3j-1; & j = 1,3,5 \\ 15(i-1)+3j & j = 2,4 \end{cases}$$

$$f(v_{ij}v_{ij+1}) = \begin{cases} 15(i-1)+3j+1; & j = 1,2,3 \\ 15(i-1)+3j+3; & j = 4 \end{cases}$$

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$f(v_{i1}v_{ij}) = 15(i-1) + 3j + 1, \ \ j = 5.$

Therefore, for any edge $uv \in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence $G = W_5^m$ admits an edge vertex prime graph.

Theorem 3.6 One point union of *m* copies W_7 is an edge vertex prime graph.

Proof. Let $G = W_7^m$ be a graph. Then $V(G) = \{v, v_{ij} : 1 \le i \le m, 1 \le j \le 7\}$ and

$E(G) = \{vv_{ij} : 1 \le i \le m, 1 \le j \le 7\} \cup \{v_{ij}v_{ij+1} : 1 \le i \le m, 1 \le j \le 6\} \cup \{v_{i1}v_{i7} : 1 \le i \le m\}$

. Also, $|V(G)| = 7m + 1$ and $|E(G)| = 14m$.

Define a bijective function $f: V(G) \cup E(G) \to \{1,2,\dots,21m+1\}$ by $f(v) = 1$. Consider i^{th} copy of the following cases.

Case 1. Even number of copies, that is, $i = 2,4,6,\dots$

$$f(v_{ij}) = \begin{cases} 21(i-1) + 3j - 1; & j = 1,3,5,7 \\ 21(i-1) + 3j & j = 2,4,6 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 21(i-1) + 3j; & j = 1,3,5,7 \\ 21(i-1) + 3j - 1; & j = 2,4,6 \end{cases}$$

Subcase 1a. $m \not\equiv 4 (mod\ 10)$

$f(v_{ij}v_{ij+1}) = 21(i-1) + 3j + 1, \ \ j = 1,2,3,4,5,6$

$f(v_{i1}v_{ij}) = 21(i-1) + 3(j+1) + 1, \ \ j = 7.$

Subcase 1b. $m \equiv 4 (mod\ 10)$

$f(v_{ij}v_{ij+1}) = 21(i-1) + 3j + 1, \ \ j = 1,2,3,4,5$

$f(v_{ij}v_{ij+1}) = 21(i-1) + 3(j+1) + 1, \ \ j = 6$

$f(v_{i1}v_{ij}) = 21(i-1) + 3j - 2, \ \ j = 7.$

Case 2. Odd number of copies, that is, $i = 1,3,5,\dots$

$$f(v_{ij}) = \begin{cases} 21(i-1) + 3j; & j = 1,3,5 \\ 21(i-1) + 3j - 1; & j = 2,4,6 \\ 21(i-1) + 3j - 2; & j = 7 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 21(i-1) + 3j - 1; & j = 1,3,5,7 \\ 21(i-1) + 3j & j = 2,4,6 \end{cases}$$

$f(v_{ij}v_{ij+1}) = 21(i-1) + 3j + 1, \ \ j = 1,2,3,4,5$

$f(v_{i1}v_{ij}) = 21(i-1) + 3j + 3, \ \ j = 6.$

$f(v_{i1}v_{i7}) = 21(i-1) + 3j + 1,$ j=7

Clearly, for any edge $uv \in E(G)$, the numbers $f(u), f(v)$ and $f(uv)$ are pairwise relatively prime. Hence $G = W_7^m$ admits an edge vertex prime graph.

Theorem 3.7 One point union of *m* copies W_9 is an edge vertex prime graph.

Proof. Let $G = W_9^m$ be a graph. Then $V(G) = \{v, v_{ij} : 1 \le i \le m, 1 \le j \le 9\}$ and

$E(G) = \{vv_{ij} : 1 \le i \le m, 1 \le j \le 9\} \cup \{v_{ij}v_{ij+1} : 1 \le i \le m, 1 \le j \le 8\} \cup \{v_{i1}v_{i9} : 1 \le i \le m\}$

. Also, $|V(G)| = 9m + 1$ and $|E(G)| = 18m$.

Define a bijective function $f: V(G) \cup E(G) \to \{1,2,\dots,27m+1\}$ by $f(v) = 1$. Consider i^{th} copy of the following cases.

Case 1. Even number of copies, that is, $i = 2,4,6,\dots$

$$f(v_{ij}) = \begin{cases} 27(i-1) + 3j - 1; & j = 1,3,5,7,9 \\ 27(i-1) + 3j & j = 2,4,6,8 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 27(i-1) + 3j; & j = 1,3,5,7,9 \\ 27(i-1) + 3j - 1; & j = 2,4,6,8 \end{cases}$$

$f(v_{ij}v_{ij+1}) = 27(i-1) + 3j + 1, \ \ j = 1,2,3,4,5,6,7,8$

$f(v_{i1}v_{ij}) = 27(i-1) + 3j + 1, \ \ j = 9.$

Case 2. Odd number of copies, that is, $i = 1,3,5,\dots$

$$f(v_{ij}) = \begin{cases} 27(i-1) + 3j; & j = 1,3,5,7 \\ 27(i-1) + 3j - 1; & j = 2,4,6,8 \\ 27(i-1) + 3j - 2; & j = 9 \end{cases}$$

$$f(vv_{ij}) = \begin{cases} 27(i-1) + 3j - 1; & j = 1,3,5,7 \\ 27(i-1) + 3j & j = 2,4,6,8 \end{cases}$$

$f(v_{ij}v_{ij+1}) = 27(i-1) + 3j + 1, \ \ j = 1,2,3,4,5,6,7$

Subcase 2a. $m \not\equiv 7 (mod\ 10)$

$f(vv_{ij}) = 27(i-1) + 3j - 1, \ \ j = 9,$

$f(v_{ij}v_{ij+1}) = 27(i-1) + 3j + 1, \ \ j = 8,$

$f(v_{i1}v_{ij}) = 27(i-1) + 3j - 2, \ \ j = 9.$

Subcase 2b. $m \equiv 7 (mod\ 10)$

$f(vv_{ij+1}) = 27(i-1) + 3j + 1, \ \ j = 9$

$f(v_{ij}v_{ij+1}) = 27(i-1) + 3(j+1), \ \ j = 8$

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$f(v_{i1}v_{ij}) = 27(i-1) + 3j - 1,\ j = 9.$

Clearly, for any edge $uv \in E(G)$, the numbers $f(u), f(v)$ and $f(uv)$ are pairwise relatively prime. Hence $G = W_9^m$ admits an edge vertex prime graph.

Theorem 3.8 One point union of *m* copies of C_n^m, $n = 3, 5, 7, 9, 11$ is an edge vertex prime graph.

Proof. Let $G = C_n^m$, $(n = 3,5,7,9,11)$ be a graph. Then $V(G) = \{v, v_{ij}: 1 \le i \le m, 1 \le j \le n-1\}$ and $E(G) = \{vv_{i1}, vv_{i(n-1)}: 1 \le i \le m\} \cup \{v_{ij}v_{ij+1}: 1 \le i \le m, 1 \le j \le n-2\}$. Also, $|V(G)| = m(n-1) + 1$ and $|E(G)| = mn$.

Define a bijective function $f: V(G) \cup E(G) \to \{1,2,\dots,2mn - m + 1\}$ by $f(v) = 1$. Consider i^{th} copy of the following cases.

Case 1. Odd number of copies, that is, $i = 1, 3, 5, \dots$

$f(v_{ij}) = 2n(i-1) + 2(j+1) - i,\ \ j = 1, 2, 3, \dots, n-1.$

$f(v_{ij}v_{ij+1}) = 2n(i-1) + 2(j+2) - (i+1),\ \ j = 1,2,3, \dots, n-2.$

$f(vv_{i1}) = (2n-1)i - (2n-3),$

$f(vv_{i(n-1)}) = (2n-1)i + 1.$

Case 2. Even number of copies, that is $i = 2,4,6, \dots$

$f(v_{ij}) = 2n(i-1) + 2(j+1) - (i+1),\ \ j = 1,2,3, \dots, n-1.$

$f(v_{ij}v_{ij+1}) = 2n(i-1) + 2(j+2) - (i+2),\ \ j = 1,2,3, \dots n-2.$

Consider the following subcases.

Subcase 2a. Consider *n* = 3, 5, 9, if we take *n*= 7, then $m \not\equiv 2(mod\ 6)$ and if we take *n* = 11, then $m \not\equiv 4(mod\ 10)$.

$f(vv_{i1}) = (2n-1)i + 1,$

$f(vv_{i(n-1)}) = (2n-1)i.$

Subcase 2b. If we take *n* = 7, then $m \equiv 2(mod\ 6)$ and if we take *n* = 11, then $m \equiv 4(mod\ 10)$.

$f(vv_{i1}) = (2n-1)i,$

$f(vv_{i(n-1)}) = (2n-1)i + 1.$

Clearly, for any edge $uv \in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence $G = C_n^m$ admits an edge vertex prime graph.

Theorem 3.9 One point union of *m* copies of C_4 is an edge vertex prime graph.

Proof. Let $G = C_4^m$ be a graph. Then $V(G) = \{v, v_{ij}: 1 \le i \le m, 1 \le j \le 3\}$ and $E(G) = \{vv_{i1}, vv_{i3}: 1 \le i \le m\} \cup \{v_{ij}v_{ij+1}: 1 \le i \le m, 1 \le j \le 2\}$

Also, $|V(G)| = 3m + 1$ and $|E(G)| = 4m$.

Define a bijective function $f: V(G) \cup E(G) \to \{1,2, \dots, 7m+1\}$ by $f(v) = 1$

Consider i^{th} copy of the following cases.

Case 1. Odd number of copies, that is, $i = 1,3,5, \dots$

$f(v_{ij}) = 8(i-1) + 2(j+1) - i,\ \ j = 1,2,3$

$f(v_{ij}v_{ij+1}) = 8(i-1) + 2(j+2) - (i+1),\ \ j = 1,2$

$f(vv_{i1}) = 7i - 5, f(vv_{i3}) = 7(i+1) + 1.$

Case 2. Even number of copies, that is, $i = 2,4,6, \dots$

$f(v_{ij}) = 8(i-1) + 2(j+1) - (i+1),\ \ j = 1,2,3$

$f(v_{ij}v_{ij+1}) = 8(i-1) + 2(j+2) - (i+2),\ \ j = 1$

, 2

$f(vv_{i1}) = 7(i-1) + 1, f(vv_{i3}) = 7i.$

Therefore, for any edge $uv \in E(G)$, the numbers $f(u), f(v)$ and $f(uv)$ are pairwise relatively prime. Hence $G = C_4^m$ admits an edge vertex prime graph.

Theorem 3.10 One point union of *m* copies of C_6 is an edge vertex prime graph.

Proof. Let $G = C_6^m$ be a graph. Then $V(G) = \{v, v_{ij}: 1 \le i \le m, 1 \le j \le 5\}$ and $E(G) = \{vv_{i1}, vv_{i5}: 1 \le i \le m\} \cup \{v_{ij}v_{ij+1}: 1 \le i \le m, 1 \le j \le 4\}$

Also, $|V(G)| = 5m + 1$ and $|E(G)| = 6m$.

Define a bijective function $f: V(G) \cup E(G) \to \{1,2, \dots, 11m+1\}$ by $f(v) = 1$. Consider i^{th} copy of the following cases.

Case 1. Odd number of copies, that is, $i = 1,3,5, \dots$

$f(v_{ij}) = 12(i-1) + 2(j+1) - i,\ \ j = 1,2,3,4,5$

$f(v_{ij}v_{ij+1}) = 12(i-1) + 2(j+2) - (i+1),\ \ j = 1,2,3,4$

$f(vv_{i1}) = 11i - 9, f(vv_{i5}) = 11i + 1.$

Case 2. Even number of copies, that is, $i = 2,4,6, \dots$

$f(v_{ij}) = 12(i-1) + 2(j+1) - (i+1),\ \ j = 1,2,3,4,5$

$f(v_{ij}v_{ij+1}) = 12(i-1) + 2(j+2) - (i+2),\ \ j = 1$

,2,3,4

Subcase 2a. $m \not\equiv 4(mod\ 10)$

$f(vv_{i1}) = 11i + 1, f(vv_{i5}) = 11i.$

Subcase 2b. $m \equiv 4(mod\ 10)$

$f(vv_{i1}) = 11i, f(vv_{i5}) = 11i + 1.$

Therefore, for any edge $uv \in E(G)$, $gcd(f(u), f(v)) = 1$, $gcd(f(u), f(uv)) = 1$, $gcd(f(v), f(uv)) = 1$. Hence $G = C_6^m$ admits an edge vertex prime graph.

IV. CONCLUSION

We proved that if $G(p,q)$ has an edge vertex prime graph with $p+q$ is even, then there exists a graph from the class $G \cup P_n$ that admits an edge vertex prime graph. One point union of *m* copies W_5 is an edge vertex prime graph. One point union of *m* copies W_7 is an edge vertex prime graph. One point union of *m* copies W_9 is an edge vertex prime graph. One point union of *m* copies of C_n^m , $n = 3, 5, 7, 9, 11$ is an edge vertex . One point union of *m* copies of C_6 is an edge vertex prime graph.

REFERENCES

1. Balakrishnan. R and Ranganathan. K, *A Text Book of Graph Theory*, Second Edition, Springer. New York 2012.
2. Gallian. J. A, *A Dynamic Survey of Graph Labeling*, Electronic Journal of Combinatorics, DS6, 2015.
3. Jagadesh. R, Baskar Babujee. J, *Edge Vertex Prime Labeling for some class of Graphs*, National Conference on Recent Trends in Mathematics and its Applications, 24-25 February 2017, SRM University, Vadapalani, Chennai, India.
4. Jagadesh. R, Baskar Babujee. J, *On Edge Vertex Prime Labeling*, International Journal of Pure and Applied Mathematics, Vol.114 No.6, 2017, 209-218.
5. Parmar. Y, *Edge Vertex Prime Labeling for Wheel, Fan and Friendship Graph*, International Journal of Mathematics and Statistics Invention,Vol.5 Issue 8, October 2017, 23-29.
6. Parmar. Y, *Vertex Prime Labeling for* $K_{2,m}$ *and* $K_{3,m}$ *Graphs*, Mathematical Journal of Interdisciplinary Sciences Vol.6 No.2, March 2018, 167-180.
7. Simaringa. M, Muthukumaran. S, *Edge Vertex Prime Labeling of Some Graphs*, Malaya Journal of Mathematik, Vol.7, No.2, 264-268, 2019.
8. Simaringa. M, Muthukumaran. S, Subhasri.S, *Edge Vertex Prime Labeling of Trees*, JETIR,Vol.6, Issue.5, 282-287, May-2019.
9. Simaringa. M, Muthukumaran. S, *Edge Vertex Prime Labeling of Graphs*, Malaya Journal of Mathematik, Vol.7, No.3, 572-578, 2019.
10. Tout. A, Dabboucy. A. N, Howalla. K, *Prime Labeling of Graphs*, National Academy Science, Letters, 11,1982, 365-368.

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