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Neighborhood-Prime labeling for some graphs

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Abstract

We consider here a graph with n vertices and m edges denoted by G having vertex set as $V(G)$ and edge set as $E(G)$. If there is a bijective function f from $V(G)$ to the set of positive integer upto $|V(G)|$ such that for every vertex u with degree at least two the gcd of the labels of adjacent vertices of u is 1 then f is called neighborhood-prime labeling and G is called neighborhood-prime graph. In the present work we constructed some particular graphs and we proved these are neighborhood-prime graphs.

Keywords

Neighborhood of a vertex, neighborhood-prime labeling.

AMS Subject Classification (2010)

05C78.

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Contents

1. Introduction and Definitions

In our investigation we consider simple, finite, connected, undirected graphs with $V(G)$ and $E(G)$ as vertex set and edge set respectively. For various notation and terminology we follow Gross Yellen [4] and for some results of number theory we follow Burton [2]. Now We give brief note of definition which are useful in present investigation.

Definition 1.1 : Consider a graph $G=[V(G),E(G)]$ with n vertices and a bijective function $f:V(G)\rightarrow\{1,2,3...n\}$. We say that f is prime labeling if for every $e\in E(G)$ with $e=uv$, $(f(u),f(v))=1$. A graph having prime labeling is called prime graph [1].

Definition 1.2 : For vertex v in G, neighborhood of v is the set of all vertices which are at distance one to v and it is denoted by $N(v)$.

Definition 1.3 : Consider a graph $G=[V(G),E(G)]$ with n vertices and a bijective function $f:V(G)\rightarrow\{1,2,3...n\}$. We say that f is a neighborhood-prime labeling if for every vertex u in G with $deg(u)>1, gcd\{f(p)|p\in N(u)\}=1$ and graph G is called neighborhood-prime graph [5].

Definition 1.4 : A Helm H_n is the graph obtained from the wheel graph $W_n=C_n+K_1$ by attaching a pendent edge to each vertex of cycle in C_n .

A concept of prime labeling was given by Entringer. Tout-et-all introduced prime labeling in [1]. Now a days it is an interesting field of research. S.K.Patel and N.P.Shrimali introduced the the notion neighborhood-prime labeling and they shown that Helm, Cycle, Path admit neighborhood-prime labeling [5]. In [6] they proved union of some graphs are neighborhood-prime. For further list of results regarding prime graph and neighborhood-prime graph reader may refer [3].

2. Main Results

Theorem 2.1:$H_n(W_n)$ is neighborhood-prime graph where the graph $H_n(W_n)$ is obtained by identifying each pendent vertex of H_n by rim vertex of Wheel graph W_n.

Proof : In a graph $G=H_n(W_n)$ central vertex of H_n is denoted by u and rim vertices of H_n are denoted by $u_1,u_2,u_3...u_n$. In a i^{th} copy of W_n in a graph G the rim vertex of W_n which is identified with pendent vertex of H_n is denoted by $u_{i,1}$, remaining rim vertices of W_n are denoted by $u_{i,2}$, $u_{i,3}$ ... $u_{i,n}$ and central vertex of W_n is denoted by $u_{i,n+1}$ for each i.

Case:(i) n is even.

We define $f:V(G)\longrightarrow\{1,2,3,...|V(G)|\}$ as follows.

$f(u)=2$, $f(u_1)=1$, $f(u_{1,1})=3$

$f(u_i)=2+(i-1)(n+2);\quad 2\leq i\leq n$

$f(u_{i,1}) = 3+(i-1)(n+2); \quad 2 \le i \le n$
$f(u_{i,j}) = j+2+(i-1)(n+2); \quad 1 \le i \le n : 2 \le j \le n+1$
we consider w as a vertex at each position in a graph G. We will show that $gcd\{f(p)|p \in N(w)\} = 1$.
If $w = u$, $u_1 \in N(w)$ and $f(u_1) = 1$.
If $w = u_i$ for any i, $\{u, u_{i,1}\} \subseteq N(w)$. $f(u) = 2$ and $f(u_{i,1})$ is odd for each i.
If $w = u_{i,1}$ for any i, $\{u_{i,n}, u_{i,n+1}\} \subseteq N(w)$. $f(u_{i,n})$ and $f(u_{i,n+1})$ are consecutive numbers.
If $w = u_{i,j}$ for any i and $j = 2k$ where $k = 1,2,3....\frac{n}{2}$, $\{u_{i,j-1}, u_{i,j+1}\} \subseteq N(w)$. $f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive odd numbers.
If $w = u_{i,j}$ for any i and $j = 2k+1$ where $k = 1,2,3....\frac{n-2}{2}$, $\{u_{i,j-1}, u_{i,j+1} u_{i,n+1}\} \subseteq N(w)$. $f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive even numbers and $f(u_{i,n+1})$ is odd number.
If $w = u_{i,n+1}$ for any i , $N(w) = \{u_{i,1}, u_{i,2}, u_{i,3} ....u_{i,n}\}$.
$f(u_{i,1}), f(u_{i,2}), f(u_{i,3}), ...f(u_{i,n})$ are consecutive numbers.
Case:(ii) n is odd.
We define $f : V(G) \longrightarrow \{1,2,3,...|V(G)|\}$ as follows.
$f(u) = 1$
$f(u_i) = 2+(i-1)(n+2); \quad 1 \le i \le n$
$f(u_{i,j}) = j+2+(i-1)(n+2); \quad 1 \le i \le n : 1 \le j \le n-1$

$$f(u_{i,n}) = \begin{cases} n+3+(i-1)(n+2); & i = 2k-1 \ where\ k = 1,2,3...\frac{n+1}{2} \\ n+2+(i-1)(n+2); & i = 2k \ where\ k = 1,2,3...\frac{n-1}{2} \end{cases}$$

for $1 \le i \le n$

$$f(u_{i,n+1}) = \begin{cases} n+2+(i-1)(n+2); & i = 2k-1 \ where\ k = 1,2,3...\frac{n+1}{2} \\ n+3+(i-1)(n+2); & i = 2k \ where\ k = 1,2,3...\frac{n-1}{2} \end{cases}$$

for $1 \le i \le n$

We consider w as a vertex at each position in a graph G. We will show that $gcd\{f(p)|p \in N(w)\} = 1$.
If $w = u$, $\{u_1, u_2\} \subseteq N(w)$. $f(u_1) = 2$ and $f(u_2)$ is odd number .
If $w = u_i$ for any i, $u \in N(w)$. $f(u) = 1$.
If $w = u_{i,1}$ for any i, $\{u_{i,n}, u_{i,n+1}\} \subseteq N(w)$. $f(u_{i,n})$ and $f(u_{i,n+1})$ are consecutive numbers.
If $w = u_{i,j}$ for $i = 2k-1$, $j = 2m$ where $k = 1,2,3....\frac{n+1}{2}$ and $m = 1,2,3....\frac{n-3}{2}$; $\{u_{i,j-1}, u_{i,j+1}\} \subseteq N(w)$. $f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive odd numbers.
If $w = u_{i,j}$ for $i = 2k-1$, $j = 2m+1$ where $k = 1,2,3....\frac{n+1}{2}$ and $m = 1,2,3....\frac{n-3}{2}$; $\{u_{i,j-1}, u_{i,j+1} u_{i,n+1}\} \subseteq N(w)$.
$f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive even numbers and $f(u_{i,n+1})$ is odd number.
If $w = u_{i,j}$ for $i = 2k$, $j = 2m$ where $k = 1,2,3....\frac{n-1}{2}$ and $m = 1,2,3....\frac{n-3}{2}$; $\{u_{i,j-1}, u_{i,j+1} u_{i,n+1}\} \subseteq N(w)$. $f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive even numbers and $f(u_{i,n+1})$ is odd number.
If $w = u_{i,j}$ for $i = 2k$, $j = 2m+1$ where $k = 1,2,3....\frac{n-1}{2}$ and $m = 1,2,3....\frac{n-3}{2}$; $\{u_{i,j-1}, u_{i,j+1}\} \subseteq N(w)$. $f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive odd numbers.
If $w = u_{i,n-1}$ for any i ,$\{u_{i,n}, u_{i,n+1}\} \subseteq N(w)$. $f(u_{i,n})$ and $f(u_{i,n+1})$ are consecutive numbers.
If $w = u_{i,n}$ for any i ,$\{u_{i,n-1}, u_{i,n+1}\} \subseteq N(w)$. $f(u_{i,n-1})$ and $f(u_{i,n+1})$ are either consecutive numbers or consecutive odd numbers .
If $w = u_{i,n+1}$ for i , $\{u_{i,1}, u_{i,2}\} \subseteq N(w)$. $f(u_{i,1})$ and $f(u_{i,1})$ are consecutive numbers.
So f is neighborhood-prime labeling.

Illustration 2.1 Consider the graph $H_6(W_6)$. The labeling is as shown in Figure 1.

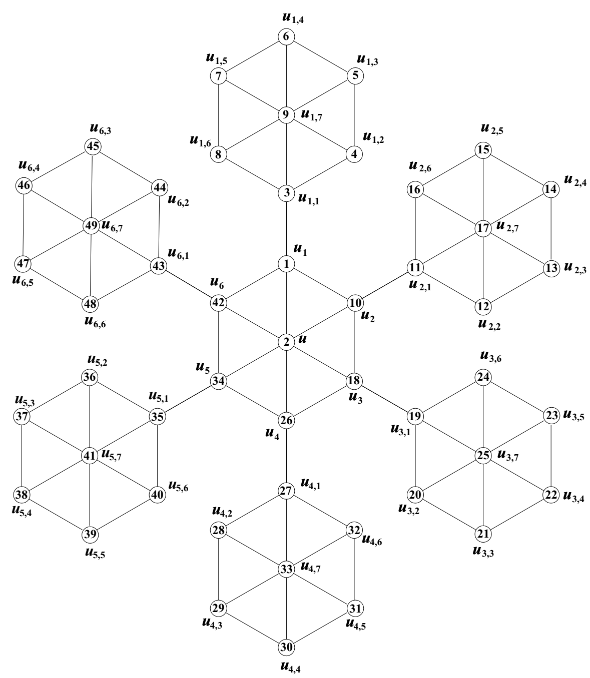

Figure 1: Neighborhood-prime labeling for $H_6(W_6)$.

Theorem 2.2: $H_n(F_n)$ is neighborhood-prime graph where the graph $H_n(F_n)$ is obtained by identifying each pendent vertex of H_n by vertex of maximum degree in F_n.
Proof : In a graph $G = H_n(F_n)$ central vertex of H_n is denoted by u and rim vertices of H_n are denoted by $u_1, u_2, u_3, ...u_n$. In a i^{th} copy of F_n in a graph G the vertex of F_n which is identified with pendent vertex of H_n is denoted by $u_i^{'}$ and remaining vertices of F_n are denoted by $u_{i,1}$, $u_{i,2}$, $u_{i,3}$ .... $u_{i,n}$ for each i .
Case:(i) n is odd.

Here we consider two sub cases.

sub case:(i) $n = 3$

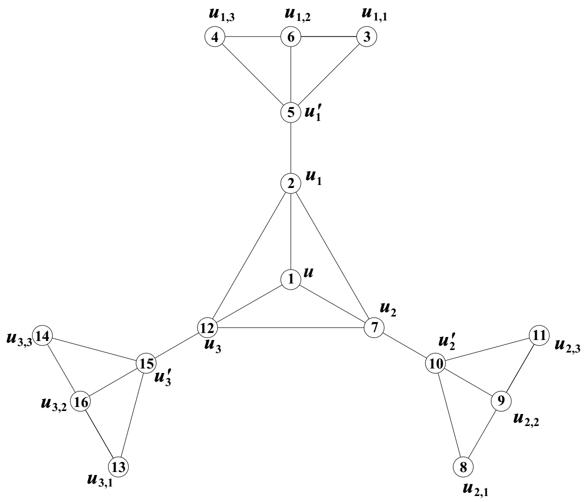

Figure 2: Neighborhood-prime labeling for $H_3(F_3)$.

sub case:(ii) $n \geq 5$

We define function f as follows.

$f(u) = 1$.

$f(u_i) = 2 + (i-1)(n+2) \quad ; 1 \leq i \leq n$

$$f(u_i{'}) = \begin{cases} (\frac{n+9}{2}) + \left\lfloor \frac{i}{2} \right\rfloor (n+1) + \left\lfloor \frac{i-1}{2} \right\rfloor (n+3) & ; n \equiv 1(mod\ 4) \\ (\frac{n+7}{2}) + \left\lfloor \frac{i}{2} \right\rfloor (n+3) + \left\lfloor \frac{i-1}{2} \right\rfloor (n+1) & ; n \equiv 3(mod\ 4) \end{cases}$$

for $1 \leq i \leq n$

$f(u_{i,1}) = 3 + (i-1)(n+2); \quad 1 \leq i \leq n$

$$f(u_{2i-1,2}) = \begin{cases} (\frac{n+11}{2}) + \left\lfloor \frac{2i-1}{2} \right\rfloor (n+1) + \left\lfloor \frac{2i-2}{2} \right\rfloor (n+3) & ; n \equiv 1(mod\ 4) \\ (\frac{n+11}{2}) + \left\lfloor \frac{2i-1}{2} \right\rfloor (n+3) + \left\lfloor \frac{2i-2}{2} \right\rfloor (n+1); & ; n \equiv 3(mod\ 4) \end{cases}$$

for $1 \leq i \leq \frac{n+1}{2}$

$$f(u_{2i,2}) = \begin{cases} (\frac{n+13}{2}) + i(n+1) + \left\lfloor \frac{2i-1}{2} \right\rfloor (n+3) & ; n \equiv 1(mod\ 4) \\ (\frac{n+9}{2}) + i(n+3) + \left\lfloor \frac{2i-1}{2} \right\rfloor (n+1) & ; n \equiv 3(mod\ 4) \end{cases}$$

for $1 \leq i \leq \frac{n-1}{2}$

$f(u_{i,2j+1}) = 3 + j + (i-1)(n+2) \; ; \quad 1 \leq i \leq n$ and $1 \leq j \leq \frac{n-3}{2}$

$f(u_{i,2j+2}) = f(u_{i,2}) + j \; ; \quad 1 \leq i \leq n$ and $1 \leq j \leq \frac{n-5}{2}$

$f(u_{i,n-1}) = \frac{n+5}{2} + (i-1)(n+2) \; ; \quad 1 \leq i \leq n$

$$f(u_{2i-1,n}) = \begin{cases} \frac{n+7}{2} + (2i-2)(n+2); & n \equiv 1(mod\ 4) \\ \frac{n+9}{2} + (2i-2)(n+2); & n \equiv 3(mod\ 4) \end{cases}$$

for $1 \leq i \leq \frac{n+1}{2}$

$$f(u_{2i,n}) = \begin{cases} \frac{n+9}{2} + (2i-1)(n+2); & n \equiv 1(mod\ 4) \\ \frac{n+7}{2} + (2i-1)(n+2); & n \equiv 3(mod\ 4) \end{cases}$$

for $1 \leq i \leq \frac{n-1}{2}$

We consider w as a vertex at each position in a graph G. We will show that $gcd\{f(p) | p \in N(w)\} = 1$.

If $w = u$, $u_i \in N(w)$ for each i. Also $f(u_1) = 2, f(u_{2k})$ is odd number for each k. .

If $w = u_i$ for any i, $u \in N(w)$ and $f(u) = 1$.

If $w = u_i'$ for any i, $\{u_{i,j} | j = 1,2,...n\} \subseteq N(w)$. $f(u_{i,j})'s$ are consecutive numbers .

If $w = u_{i,1}$ for any i , $\left\{u_{i,2}, u_i'\right\} = N(w)$. $f(u_{i,2})$ and $f(u_i')$ are consecutive numbers or consecutive odd numbers.

If $w = u_{i,j}$ for any i, and j for $1 \leq j \leq n-3$: $\{u_{i,j-1}, u_{i,j+1}\} \subseteq N(w)$. $f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive numbers.

If $w = u_{i,j}$ for any i and $j = n, n-2$, $\left\{u_i', u_{i,n-1}\right\} \subseteq N(w)$. $f(u_i')$ and $f(u_{i,n-1})$ are consecutive numbers or consecutive odd numbers .

If $w = u_{i,n-1}$ for any i , $\left\{u_i', u_{i,n}\right\} \subseteq N(w)$. $f(u_i')$ and $f(u_{i,n})$ are consecutive numbers .

Case:(ii) n is even.

$f(u) = 2$.

$f(u_1) = 1$, $f(u_i) = 2 + (i-1)(n+2) : \quad 2 \leq i \leq n$

$$f(u_i{'}) = \begin{cases} (\frac{n+8}{2}) + (i-1)(n+2); n \equiv 2(mod\,4) \\ (\frac{n+6}{2}) + (i-1)(n+2); n \equiv 0(mod\,4) \end{cases} ; 1 \leq i \leq n$$

$f(u_{i,1}) = 3 + (i-1)(n+2) \; ; \quad 1 \leq i \leq n$

$f(u_{i,2}) = \frac{n+10}{2} + (i-1)(n+2); \quad 1 \leq i \leq n$

$f(u_{i,2j+1}) = 3 + j + (i-1)(n+2) \; ; \quad 1 \leq i \leq n$ and $1 \leq j \leq \frac{n-2}{2}$

$f(u_{i,2j+2}) = \frac{n+10}{2} + j + (i-1)(n+2) \; ; \quad 1 \leq i \leq n$ and $1 \leq j \leq \frac{n-4}{2}$

$$f(u_{i,n}) = \begin{cases} (\frac{n+6}{2}) + (i-1)(n+2); n \equiv 2(mod 4) \\ (\frac{n+8}{2}) + (i-1)(n+2); n \equiv 0(mod 4) \end{cases} ; 1 \leq i \leq n$$

We consider w as a vertex at each position in a graph G. We will show that $gcd\{f(p) | p \in N(w)\} = 1$.

If $w = u$, $u_1 \in N(w)$. Also $f(u_1) = 1$.

$w = u_i$ for any i , $\left\{u, u_i'\right\} \subseteq N(w)$. $f(u) = 2$ and $f(u_i')$ is odd number.

If $w = u_i'$ for any i, $\{u_{i,j} | j = 1,2,...n\} \subseteq N(w)$. $f(u_{i,1}), f(u_{i,2})$, $f(u_{i,3}), ...f(u_{i,n})$ are consecutive numbers .

If $w = u_{i,1}$ for any i , $\left\{u_{i,2}, u_i^{'}\right\} = N(w)$. $f(u_{i,2})$ and $f(u_i^{'})$ are either consecutive numbers or consecutive odd numbers.
If $w = u_{i,j}$ for any i and j for $1 \le j \le n-2$, $\{u_{i,j-1}, u_{i,j+1}\} \subseteq N(w)$. $f(u_{i,j-1})$ and $f(u_{i,j+1})$ are consecutive numbers.
If $w = u_{i,n-1}$ for any i , $\left\{u_i^{'}, u_{i,n}\right\} \subseteq N(w)$. $f(u_i^{'})$ and $f(u_{i,n})$ are consecutive numbers .
If $w = u_{i,n}$ for any i , $\left\{u_i^{'}, u_{i,n-1}\right\} \subseteq N(w)$. $f(u_i^{'})$ and $f(u_{i,n-1})$ are either consecutive numbers or consecutive odd numbers.
So f is neighborhood-prime labeling.

Illustration 2.2 Consider the graph $H_6(F_6)$. The labeling is as shown in Figure 3.

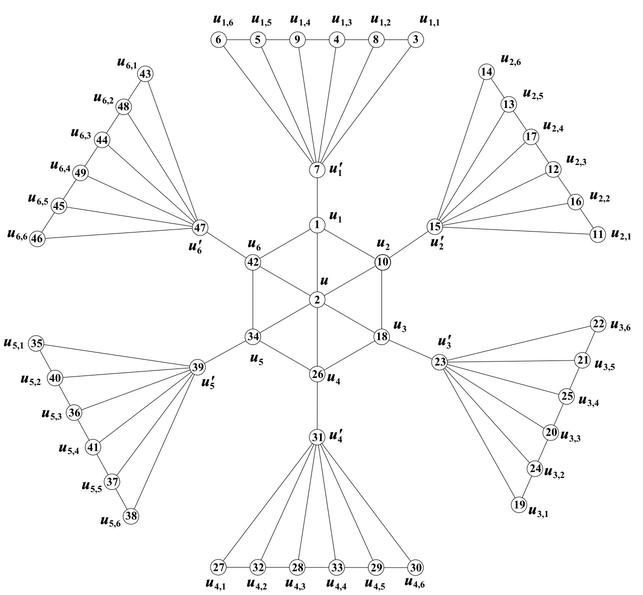

Figure 3: Neighborhood-prime labeling for $H_6(F_6)$.

Theorem 2.3: $H_n(\bar{H}_n)$ is neighborhood prime graph where the graph $H_n(\bar{H}_n)$ is obtained by identifying each pendent vertex of H_n by vertex of outer cycle of closed Helm graph $\bar{H}_n$.
Proof : In a graph $G = H_n(\bar{H}_n)$ central vertex of H_n is denoted by u and rim vertices of H_n are denoted by $u_1, u_2, u_3, ...u_n$. In i^{th} copy of $\bar{H}_n$ in a graph G the vertex of outer cycle of $\bar{H}_n$ which is identified with pendent vertex of H_n is denoted by $u_{i,n}$, vertices of outer cycle and vertices of inner cycle are denoted by $u_{i,1}, u_{i,2}....u_{i,n}$ and $u_{i,1}^{'}, u_{i,2}^{'}...u_{i,n}^{'}$ respectively in same direction for each i. More over $u_{i,j}$ and $u_{i,j}^{'}$ are adjacent vertices for $j = 1,2,3...n$ for each i. Central vertex of i^{th} copy of $\bar{H}_n$ in a graph G is denoted by v_i for each i.
We define $f : V(G) \longrightarrow \{1,2,3,...|V(G)|\}$ as follows.
$f(u) = 1$.
$f(u_1) = 2n+3$.
$f(u_i) = 2+2(i-1)(n+1); \quad 2 \le i \le n$
$f(u_{i,j}) = 2j+2+2(i-1)(n+1); 1 \le i \le n$ and $1 \le j \le n$
$f(u_{i,j}^{'}) = 2j+3+2(i-1)(n+1); 1 \le i \le n$ and $1 \le j \le n-1$
$f(u_{i,n}^{'}) = 3+2(i-1)(n+1); 1 \le i \le n$
$f(v_1) = 2$
$f(v_i) = (2n+3)+2(i-1)(n+1); \quad 2 \le i \le n$
We consider w as a vertex at each position in a graph G. We will show that $gcd\{f(p)|p \in N(w)\} = 1$.
If $w = u$, $\{u_1, u_2\} \subseteq N(w)$. $f(u_1)$ and $f(u_2)$ are consecutive numbers.
If $w = u_i$ for any i: $u \in N(w)$ and $f(u) = 1$.
If $w = u_{i,j}$ for any i and $j \neq n$, $\left\{u_{i,j}^{'}, u_{i,j+1}\right\} \subseteq N(w)$. $f(u_{i,j}^{'})$ and $f(u_{i,j+1})$ are consecutive numbers.
If $w = u_{i,n}$ for any i , $\left\{u_{i,n}^{'}, u_{i,1}\right\} \subseteq N(w)$. $f(u_{i,n}^{'})$ and $f(u_{i,1})$ are consecutive numbers.
If $w = u_{i,j}^{'}$ for any i and $j \neq 1$, $\left\{u_{i,j-1}^{'}, u_{i,j}\right\} \subseteq N(w)$. $f(u_{i,j-1}^{'})$ and $f(u_{i,j})$ are consecutive numbers.
If $w = u_{i,1}^{'}$ for any i , $\left\{u_{i,n}^{'}, u_{i,1}\right\} \subseteq N(w)$. $f(u_{i,n}^{'})$ and $f(u_{i,1})$ are consecutive numbers.
If $w = v_i$ for any i, $N(w) = \left\{u_{i,j}^{'} | j = 1,2,..n\right\}$ also $f(u_{i,j}^{'})$ are consecutive odd numbers.
So f is neighborhood-prime labeling.

Illustration 2.3 Consider the graph $H_5(\bar{H}_5)$. The labeling is as shown in Figure 4.

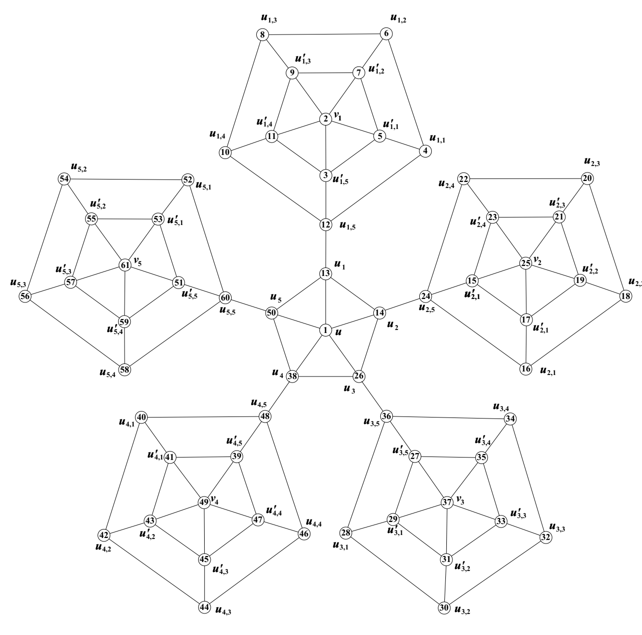

Figure 4: Neighborhood-prime labeling for $H_5(\bar{H}_5)$.

Theorem 2.4: $H_n(GP(5,2))$ is neighborhood-prime graph where the graph $H_n(GP(5,2))$ is obtained by identifying each pendent vertex of H_n by vertex of outer cycle of petersen graph $GP(5,2)$.
Proof :In a graph $G = H_n(GP(5,2))$ central vertex of H_n is denoted by u and rim vertices of H_n are denoted by $u_1, u_2, u_3, ...u_n$. In i^{th} copy of petersen graph $GP(5,2)$ in a graph G the vertex

of $GP(5,2)$ which is identified with pendent vertex of H_n is denoted by $u_{i,5}$,vertices of outer cycle and vertices of inner cycle are denoted by $u_{i,1}, u_{i,2} \dots u_{i,5}$ and $u'_{i,1}, u'_{i,2} \dots u'_{i,5}$ respectively in same direction for each i. More over $u_{i,j}$ and $u'_{i,j}$ are adjacent vertices for $j = 1,2\dots5$ for each i.

We define $f : V(G) \longrightarrow \{1,2,3,...|V(G)|\}$ as follows.

$f(u) = 1$.

$f(u_i) = 2+(i-1)11; 1 \le i \le n$

$f(u_{2i-1,j}) = 2j+2+(2i-2)11$; $1 \le i \le \left\lfloor \frac{n+1}{2} \right\rfloor$ and $1 \le j \le 5$

$f(u_{2i,j}) = 2j+1+(2i-1)11$; $1 \le i \le \left\lfloor \frac{n}{2} \right\rfloor$ and $1 \le j \le 5$

$f(u'_{2i-1,j}) = 2j+3+(2i-2)11$; $1 \le i \le \left\lfloor \frac{n+1}{2} \right\rfloor$ and $1 \le j \le 4$

$f(u'_{2i-1,5}) = 3+(2i-2)11$; $1 \le i \le \left\lfloor \frac{n+1}{2} \right\rfloor$

$f(u'_{2i,j}) = 2j+4+(2i-1)11$; $1 \le i \le \left\lfloor \frac{n}{2} \right\rfloor$ and $1 \le j \le 4$

$f(u'_{2i,5}) = 4+(2i-1)11$; $1 \le i \le \left\lfloor \frac{n}{2} \right\rfloor$

We consider w as a vertex at each position in a graph G. We will show that $gcd\{f(p)|p \in N(w)\} = 1$.

If $w = u$, $\{u_1, u_2\} \subseteq N(w)$.$f(u_1) = 2$ and $f(u_2)$ is odd number.

If $w = u_i$ for any i, $u \in N(w)$ and $f(u) = 1$.

If $w = u_{i,j}$ for any i and $j \ne 5$, $\left\{u'_{i,j}, u_{i,j+1}\right\} \subseteq N(w)$. $f(u'_{i,j})$ and $f(u_{i,j+1})$ are consecutive numbers.

If $w = u_{i,5}$ for any i , $\left\{u'_{i,5}, u_{i,1}\right\} \subseteq N(w)$. $f(u'_{i,5})$ and $f(u_{i,1})$ are consecutive numbers.

If $w = u'_{i,j}$ for any i and $j \ne 2$, $\left\{u'_{i,j+2}, u'_{i,j+3}\right\} \subseteq N(w)$. $f(u_{i,j+2})$ and $f(u_{i,j+3})$ are consecutive odd numbers where values of $j+2$ and $j+3$ modulo 5.

If $w = u'_{i,2}$ for any i , $\{u_{i,4}, u_{i,5}\} \subseteq N(w)$. $f(u_{i,4})$ and $f(u_{i,5})$ are odd numbers of difference eight.

f is neighborhood-prime labeling.

Illustration 2.4 Consider the graph $H_5(GP(5,2))$. The labeling is as shown in Figure 5.

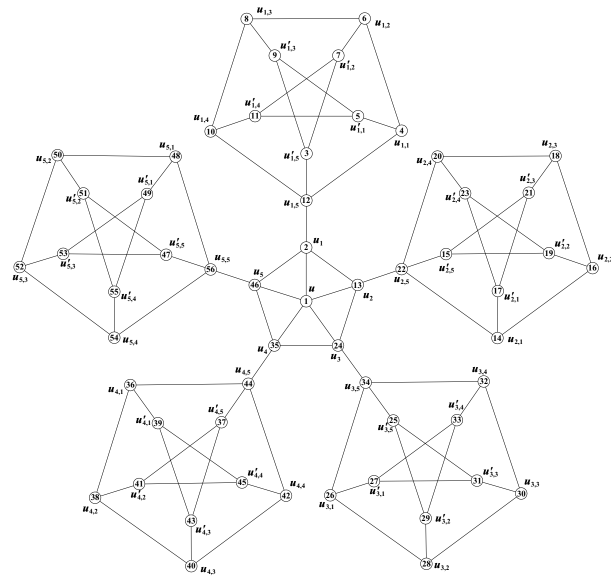

Figure 5: Neighborhood prime labeling for $H_5(GP(5,2))$

3. Concluding Remarks

Here we investigated four results corresponding to neighborhood prime labeling for some particular graphs. Analogous result can be obtained for the generalization of these graphs using various graph operations in the context of neighborhood prime labeling.

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