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Double Layered Neighbourly Irregular Fuzzy Chemical Graphs Using Vertex Cut Method

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ABSTRACT

In this paper, we derive the Double Layered Neighbourly Irregular Fuzzy Chemical Graph using Vertex Cut method by using Neighbourly Irregular Fuzzy Chemical Graph. Also find Total Irregular value for the same.

Keywords: Neighbourly Irregular Fuzzy Chemical Graphs, Neighbourly Irregular Vertex Cut Fuzzy Chemical Graphs, Double Layered Vertex Cut Neighbourly irregular Fuzzy Chemical Graphs and Total Irregular Fuzzy Chemical Graphs.

1. Introduction

The concepts of fuzzy graphs were introduced by K. S. Fu, A. Rosenfeld, M. Shirmura, K. Tanaka, L. A. Zadeh [6] and S.K. Ayyasamy and S. Gnana Bhragsam [4] introduced the concept of Neighbourly Irregular Graph, A. Nagoorgani [7] were introduced some basic definitions and notations for Fuzzy Graphs and Fuzzy Irregular Graphs. J. Arockia aruldoss and M. Arunambigai [2] introduced construction of Neighbourly Irregular chemical Graph among p-block Elements, J. Arockia aruldoss and U. Gogulalakshmi constructed independent neighbourhood number of a Neighbourly Irregular Graphs among s-Block and p-Block elements [3], S. Anjalmose & J. Arockia Aruldoss [1] introduced Neighbourly Irregular Fuzzy Chemical graphs. The double layered fuzzy graphs were introduced by J. Jesintha Rosline and T. Parthinathan [5].

In this, paper we discuss on Double Layered Neighbourly Irregular Fuzzy Chemical Graphs and their total irregular value using vertex cut method.

2. Preliminaries

A fuzzy subset of a non empty set X is a mapping σ : X $\rightarrow$[0, 1] which assigns to each element 'x' in a degree of membership $\sigma(X)$ in [0, 1] such that $0 \leq \sigma(x) \leq 1$.

2.1 Definition [6]**:**
A fuzzy graph is a pair of function G: (σ, μ) where σ is a fuzzy subset of V, μ is a symmetric fuzzy relation on σ. i.e. $\sigma : V \rightarrow [0, 1]$ and $\mu : V \times V \rightarrow [0, 1]$ such that $\mu(u,v) \leq \sigma(u) \wedge \sigma(v) \forall u, v \in V.$

2.2 Definition [1]**:**

The degree of a vertex of an neighbourly irregular fuzzy chemical graph is denoted by $d_{NIFC}(v) = \sum u \neq v \mu(v,u)$.

2.3 Definition [7]**:**
Let G = (σ, μ) be a fuzzy graph. Then G is irregular, if there is a vertex which is adjacent to the vertices with distinct degrees.

2.4 Definition [7]**:**
Let G = (σ, μ) is a fuzzy graph. Then G is totally irregular, in which each vertex has distinct total degrees with its adjacent to vertices. Where the total degree of vertex u is defined as td(u)=∑μ(u,v)+ ∑(u)=d(u)+ ∑(u).

2.5 Definition [6]**:**
If every two adjacent vertices of a fuzzy graph G = (σ, μ) has distinct total degrees, then G is said to be a Neighbourly total irregular fuzzy graph. It is denoted by $G_{NTI}=(\sigma, \mu)$.

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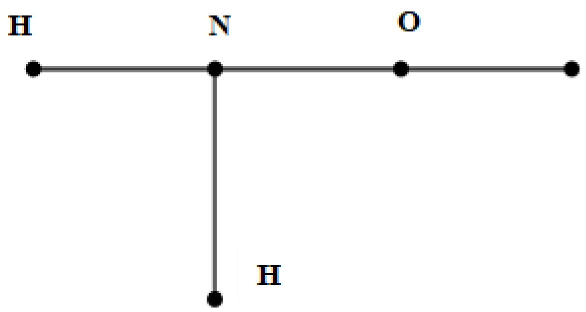
3. DOUBLE LAYERED NEIGHBOURLY IRREGULAR FUZZY CHEMICAL GRAPH (G_{DLNIFC}).

Definition 3.1:

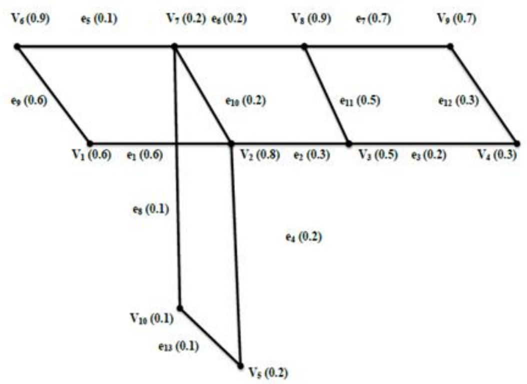
A double layered neighbourly irregular fuzzy chemical graph (G_{DLNIFC}) is obtained from a double layered fuzzy chemical graph by removing some vertices and assigning the fuzzy values. It is denoted by $G_{DLNIFC} = G_{DLFC} - \{v_i\}$ for some i, where $G_{DLFC} = (\sigma, \mu), \sigma : V \to [0, 1]$ and $\mu : V \times V \to [0, 1]$ such that $\mu(u,v) \le \sigma(u) \wedge \sigma(v) \forall u, v \in V$.

Example: 3.1

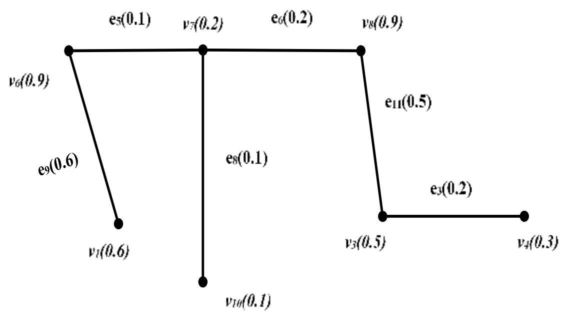
Let G_{NIC}= NH_2OH



Hydroxylamine (NH_2OH)



Double layered fuzzy chemical graph(G_{DLFC})



$G_{DLNIFC} - \{v_2, v_5, v_9\}$

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Definition 3.2:

A double layered totally neighbourly irregular fuzzy chemical graph ($G_{DLTNIFC}$) is obtained from a double layered fuzzy chemical graph by removing some vertices in which each vertex has distinct total degrees with its adjacent vertices, such that $td_{DLNIFC}(u)=\sum\mu(u,v)+\sum(u)=d(u)+\sum(u)$. It is denoted by $G_{DLTNIFC} = G_{DLFC} - \{v_i\}$ for some i.

Proposition 3.1:

If $G_{NIFC} = (\sigma, \mu)$, be a neighbourly irregular fuzzy chemical graph. Then it's every double layered fuzzy chemical graph G_{DLFC} has a double layered neighbourly irregular fuzzy chemical graph G_{DLNIFC} by using vertex cut method.

Proof:

Let us consider a double layered fuzzy chemical graph G_{DLFC} of a corresponding neighbourly irregular fuzzy chemical graph, where $G_{NIFC} = (\sigma, \mu)$.

We claim that, G_{DLFC} has a double layered neighbourly irregular vertex cut fuzzy chemical graph G_{DLNIFC}.

We know that, "Each pair of two adjacent atoms are distinct in their valencies in the molecular structures among s-block and p-block". Similarly in the corresponding double layered neighbourly irregular vertex cut fuzzy chemical graph, there exist two adjacent atoms in a double layered graph

v_n and v_{n+1} with valencies δ_r and δ_s .

ie) $d_{DLNIFC}(v_n) = \delta_r$ and $d_{DLNIFC}(v_{n+1}) = \delta_s$

And also assume that $\sigma_{DLNIFC}(v_n) = \sigma_{DLNIFC}(v_{n+1})$ = k, a constant where $k \in [0,1]$

To prove: $d_{DLNIFC}(v_n) \neq d_{DLNIFC}(v_{n+1})$

ie) $td_{DLNIFC}(v_n) \neq td_{DLNIFC}(v_{n+1})$

$$\delta_r + k \neq \delta_s + k$$
$$\delta_r \neq \delta_s$$

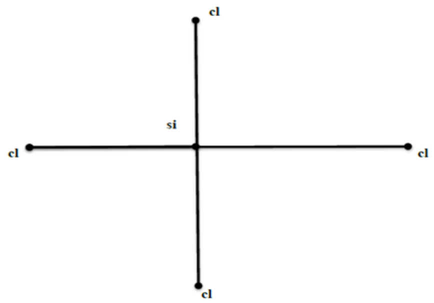
ie)Thus every pair of adjacent vertices have distinct degree.

Thus every double layered fuzzy graph(G_{DLFC})of a neighbourly irregular chemical graph has a double layered unneighborly irregular fuzzy chemical graph(G_{DLNIFC}) using vertex cut.

Consider the following example.

Example: 3.2

Let G_{NIC}= $SeCl_4$



Selenium tetrachloride ($SeCl_4$)

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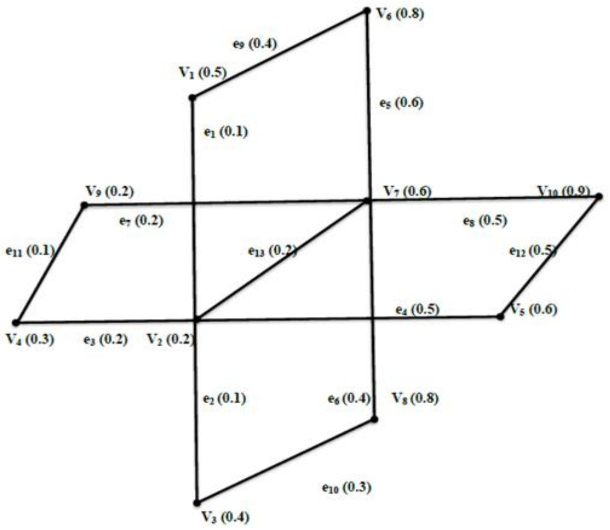
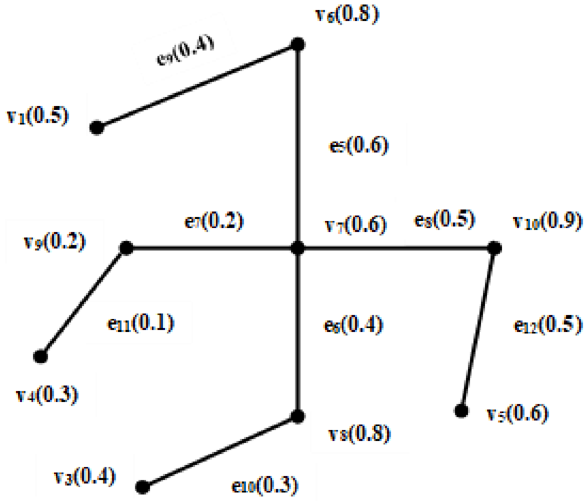




Double layered fuzzy chemical graph

G_{DLNIFC}

$G_{DLFC} - \{v_2\}$

Note 3.1: All the neighbourly irregular fuzzy chemical graphs(G_{NIFC}) can be converted to double layered neighbourly irregular fuzzy chemical graphs(G_{DLNIFC}), but the converse need not be true always.

Proposition 3.2: The neighbourly irregular graph G=(V,X), derived from the double layered neighbourly irregular vertex cut fuzzy chemical graph $G_{DLNIFC} = (\sigma, \mu)$ may be a neighbourly irregular chemical graph if each vertex of G=(V,X) is an atom of either s-block or p-block.

Note: The double layered neighourly irregular fuzzy chemical graphs using vertex cut derived from G_{NIFC} has the special the character that, the graph itself is both neighbourly irregular fuzzy graph and neighbourly irregular graph.

Proposition 3.3:

If G is a neighbourly irregular fuzzy chemical graphs (G_{NIFC}) and Let $G_{DLFC} = (\sigma, \mu)$ be a double layered fuzzy chemical graph. Then there exist a constant function σ_{DL} such that G_{DLFC} has a double layered neighbourly totally irregular fuzzy chemical graphs G_{DNTIFC}.

Proof:

Let $G_{DLFC} = (\sigma, \mu)$ be a double layered fuzzy chemical graph using vertex cut method. ie), the valencies of each pair of two adjacent atoms are distinct. Let us assume that the two adjacent atoms are distinct in the total valencies of an atom.

By using vertex cut method there exist two adjacent atoms in double layered neighbourly irregular vertex cut fuzzy graph v_m and v_n with valencies of δ_r and δ_s respectively.

ie) $d_{DLFC}(v_m) = \delta_r$

$d_{DLFC}(v_n) = \delta_s$

Assume that $\sigma_{DLFC}(v_m) = \sigma_{DLFC}(v_n) = k$, a constant function where $k \in [0, 1]$. Since

$$td_{DLFC}(v_m) = d_{DLFC}(v_m) + \sigma_{DLFC}(v_m)$$

$= \delta_r + k$

$td_{DLFC}(v_n) = d_{DLFC}(v_n) + \sigma_{DLFC}(v_n)$

$= \delta_s + k$

To prove: $td_{DLFC}(v_m) \neq td_{DLFC}(v_n)$

$$\delta_r + k \neq \delta_s + k$$
$$\delta_r - \delta_s \neq k - k$$
$$\delta_r - \delta_s \neq 0$$
$$\delta_r \neq \delta_s$$

Therefore $td_{DLFC}(v_m) \neq td_{DLFC}(v_n)$.

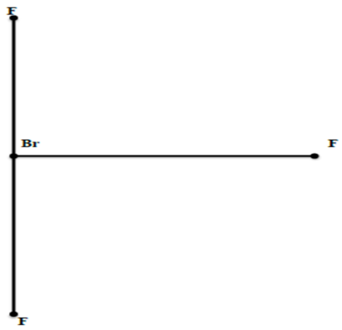
The fuzzy values are similar in double layered neighbourly irregular fuzzy chemical graph G_{DLNIFC} also, as in G_{DLFC}. So the verification holds in both the graphs.

For any two adjacent atoms with distinct valencies, its total valencies are also distinct, then σ_{DLFC} is a constant function. The above result is satisfied for every pair of adjacent atoms in $G_{DLFC} = (\sigma, \mu)$

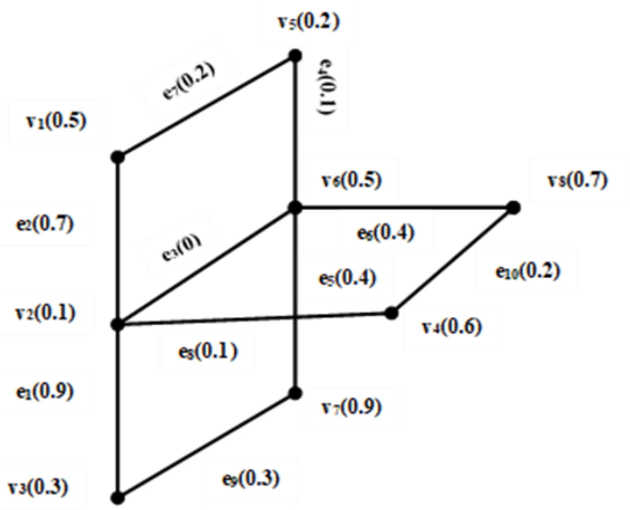
Therefore every double layered fuzzy chemical graph has a double layered neighbourly total irregular fuzzy chemical graphs using vertex cut method.

Example: 3.3

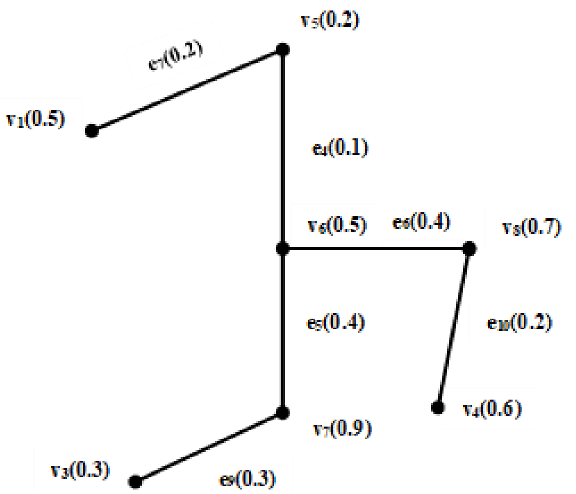
let $G_{NIFC} = BrF_3$



Bromine fluoride (BrF_3)



Double layered fuzzy chemical graph



NI double layered vertex cut fuzzy chemical graph $G_{NIDLFC} - \{v_2\}$

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4. Conclusion:

In this paper, We derived a neighbourly irregular chemical graph can be a double layered neighbourly irregular fuzzy chemical graph(G_{DLNIFC}), double layered neighbourly totally irregular fuzzy chemical graph($G_{DLNTIFC}$) and also a neighbourly irregular graph G_{NI} using vertex cut method and given some propositions with suitable examples.

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