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Total and Edge Domination on Anti Fuzzy Line Graph

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ABSTRACT: In this paper, the total dominating set, edge dominating set and domination number (TDN & EDN) for anti fuzzy line graph is computed by maxima method algorithm (MMA). This calculation is executed using strong adjacency matrix of anti fuzzy graphs and its line graphs

Keywords:

Total Domination Number (TDN); Edge Domination Number (EDN); Maxima Method Algorithm (MMA); Strong Anti Fuzzy Graph (SAFG); Anti Fuzzy Line Graph (AFLG)

1. INTRODUCTION

Anti fuzzy graph theory is one of the growing area in the field of uncertainty from the last decades. The motive of fuzzy graph theory is to reach the solution for the complexity problems within the nodes and its relation. Anti fuzzy graph theory will be the right solution when the ambiguity occurs on the relation between the nodes. Study of domination on graph plays a vital role in anti fuzzy graph. Muhammad Akram [4] introduced the concept of anti fuzzy structure in graphs. R. Seethalakshmi and R.B. Gnanajothi [5] introduced the definition of anti fuzzy graph. R.Muthuraj and A.Sasireka[10 - 13] illustrated some operations and domination algorithm on anti fuzzy graphs.

Anti fuzzy line graph is the anti fuzzy graph which is isomorphic to its corresponding AFG. [8] Toto Nusantara, Desi Rahmadani, Amianto, Yuliana Trisanti and Abdhullah Bin Gani, studied the concept of AFLG. A.Somasundaram and S.Somasundaram[9] introduced total domination in fuzzy graphs using effective edges. In this paper, the total & edge domination set, TDN and EDN for the anti fuzzy line graph from strong adjacency matrix by using maxima method algorithm (MMA). The AFLG is derived from the base AFG. It is considered as the undirected AFG with the edges having reflexive and symmetric relation.

2. PRELIMINARIES

This topic includes some essential definitions to derive the outcome of this paper. This paper considers an undirected simple and connected graph. G(σ,μ) is a fuzzy graph and GA(σ,μ) is noted as anti fuzzy graph with underlying set S. Where, S is a fuzzy subset of non empty set. Notations and definitions are followed as in [13-17].

1.1. Definition 2.1

A Fuzzy Graph G(σ,μ) consist of vertices (σ:S→[0,1]) and edges (μ:S×S→[0,1]) such that μ(x,y) ≤ min(σ(x),σ(y)) for all x and y in S.

1.2. Definition 2.2

G_A(σ,μ) is the Anti Fuzzy Graph which consist of vertices (σ:S→[0,1]) and edges (μ:S×S→[0,1]) such that μ(x,y) ≥ max(σ(x),σ(y)) for all x and y in S.

1.3. Definition 2.3

Anti fuzzy graph G_A(σ,μ) is strong if μ(x,y) = max(σ(x),σ(y)) ∀ (x,y) in μ. G_A(σ,μ) is complete if μ(x,y) = max(σ(x),σ(y)) ∀ (x,y) in σ.

1.4. Definition 2.4

Order of $G_A(\sigma,\mu) = \sum d_{G_A}(\sigma(x))$. Size of $G_A(\sigma,\mu) = \sum(\mu(x,y))$. ∀ (x,y) in σ.

1.5. Definition 2.5

The degree of a vertex σ(x) of an anti fuzzy graph is denoted and defined by $d_{G_A}(\sigma(x)) = \Sigma_{x\neq y}\,\mu(x,y)$.

1.6. Definition 2.6 [11]

A set D ⊆ V(G_A) is said to be a dominating set of an anti fuzzy graph G_A if for every vertex 'y' in (G_A)\D there exist 'x' in D such that 'y' is a strong neighborhood of 'x' with μ(x,y) = max(σ(x),σ(y)) otherwise it dominates itself.

A dominating set D with minimum number of vertices is called a minimal dominating set if no proper subset of D is a dominating set.

The maximum fuzzy cardinality taken over all minimal dominating set in G_A is called a domination number of anti fuzzy graph G_A and is denoted by γ′(G_A) or γ′A.That is, |D| f =∑y∈D σ(y).

1.7. Definition 2.7 [12]

A set D⊆V(G_A) is said to be a total dominating set of an anti fuzzy graph GA if for every vertex y ∈ V(G_A)\ D is adjacent to at least one strong neighborhood vertex in D and the induced sub graph of D has no isolated vertices. That is, A dominating set D of an anti fuzzy graph G_A is said to be a total dominating set of G_A if there exists a vertex in D is not isolate.

A total dominating set D of an anti fuzzy graph G_A with minimum number of vertices is called a minimal total dominating set of G_A if no proper subset of D is a dominating set.

The maximum fuzzy cardinality taken over all minimal total dominating set is called total domination number (TDN) of G_A and it is denoted by γt (G_A) or γA_t.

1.8. Definition 2.8 [12]

G_A is an anti fuzzy graph and x,y ∈ V(G_A). If 'y' is said to be a support vertex to 'x' then 'y' is adjacent to at least one end vertex 'x' in G_A.

Every support vertices in G_A contained in total dominating set of G_A. It may dominate more than one vertex in V\D and also in D.

Example 1 [11]

Consider the anti fuzzy graph G_A with σ = {a/0.5, b/0.6, c/0.3, d/0.1, e/0.7} and μ = {ab/0.5, bc/0.6, cd/0.3, de/0.7, ae/0.7, be/0.7}.

From this graph, the minimal edge dominating set is {de, be}. The edge domination number γ′(G_A) = 1.4.

Example 2 [12]

Consider the anti fuzzy graph G_A with σ = {a/0.4, b/0.4, c/0.6, d/0.7, e/0.8, f/0.6, g/0.3, h/0.5} and μ = {af/0.6, ae/0.8, bc/0.6, be/0.8, ed0/.8, cd/0.7, gf/0.6, gh/0.5}.

From this graph, the total dominating sets are {d,e,f,g}, {d,e,f,h} and {d,e,f,a}. The total domination numbers are 2.6, 2.3 and 2.4 respectively. The minimal total dominating set of G_A is {d,e,f,g} and γ_t (G_A) = 2.6.

1.9. Definition 2.9 [15]

$G_A(\sigma,\mu)$ be any anti fuzzy graph. The line graph of G_A denoted by L(G_A) = (X,Z), is the graph with the set of vertices X = {{e} U {uv}/ e϶E, u,v϶V, e = uv} and the set of edges Z = {S_eS_f / S_e∩S_f ≠∅, e,f ϵ E, e ≠ f}.

Where

$$S_e = \frac{\{\{e\}U\{ue\}\}}{e\epsilon E}, E, u, v\epsilon V\} \quad (1)$$

Let (σ,μ) be an anti fuzzy sub graph G_A. Define the anti fuzzy subset (λ,ω) of (X,Z) respectively as follows,

$$\forall S_e = \epsilon\, Z, \lambda(S_e) = \mu(e) \quad (2)$$

$$\forall S_e S_f \epsilon\, W, \omega(SeSf) = \max\{\mu(e), \mu(f)\} \quad (3)$$

(λ,ω) is an anti fuzzy sub graph of L(G_A), called the anti fuzzy line graph corresponding to (σ,μ).

3. MATRIX REPRESENTATION OF $G_A(\sigma, \mu)$

This topic includes the matrix representation of anti fuzzy graphs. General forms of Adjacency, incidence matrix are defined. Adjacency fuzzy matrix, strong adjacency matrix and edge adjacency matrix for AFG are given below.

1.10. Definition 3.1

Let anti fuzzy graph $G_A(\sigma, \mu)$ be a (p,q) graph with $\sigma = \{a_1, a_2, \dots an\}$. Consider the p×p matrix $A = [a_{ij}]$.

$$a_{jj} = \begin{cases} \mu_{ij,} & \text{if i and j are adjacent} \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

$\mu_{ij,}(x,y) \geq \max(\sigma_i(x), \sigma_j(y))$ for all x and y in S.

The matrix $A = [a_{ij}]$ of above representation is called adjacency matrix of $G_A(\sigma, \mu)$.

1.11. Definition 3.2

Let anti fuzzy graph $G_A(\sigma, \mu)$ be a (p, q) graph with $\sigma = \{ \sigma_1, \sigma_2, \dots \sigma_n\}$ and $\mu = \{ \mu_1, \mu_2, \dots \mu_n\}$ Consider the p×p matrix $B = [b_{ij}]$

$$bij = \begin{cases} \mu_{ij,} & \text{if } \sigma_i \text{ is incident with } \mu_j \\ 0 & \text{otherwise} \end{cases} \quad (5)$$

$\mu_{ij,}(x,y) \geq \max(\sigma_i(x), \sigma_j(y))$ for all x and y in S.

The matrix $B = [b_{ij}]$ of above representation is called incidence matrix of $G_A(\sigma, \mu)$.

1.12. Definition 3.3 [11]

The edge-weighted, edge-adjacency matrix denoted by ${}^{ew}A$ is a square unsymmetrical E X E matrix defined as,

$$[{}^{ew}A]ij = \begin{cases} 1, & \text{if the edges i and j are incident} \\ k, & \text{if the edges } i - j \text{ is weighted} \\ 0, & \text{otherwise} \end{cases} \quad (6)$$

1.13. Definition 3.4 [11]

An anti fuzzy graph GA with the fuzzy relation μ to be reflexive and symmetric is completely determined by the adjacency fuzzy matrix and it is denoted by eAμ.

$${}^{e}A_{\mu} = \begin{cases} \mu(e_j), & \text{for } i \neq j \text{ and } e_j \text{ is adjacent to } e_i \\ \mu(e_i), & \text{for } i = j \end{cases} \quad (7)$$

1.14. Definition 3.5[11]

GA be a simple connected anti fuzzy graph, the strong adjacency matrix (eAμ)' is defined as,

$${}^{e}A_{\mu} = \begin{cases} \mu(e_j), & \text{for } i \neq j \text{ and } e_j \text{ is adjacent to } e_i \\ \mu(e_i), & \text{for } i = j \end{cases} \quad (8)$$

Example 3

Consider the anti fuzzy graph $G_A(\sigma, \mu)$. It consists of σ = {a/0.7, b/0.2, c/0.4, d/0.6}and μ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6}

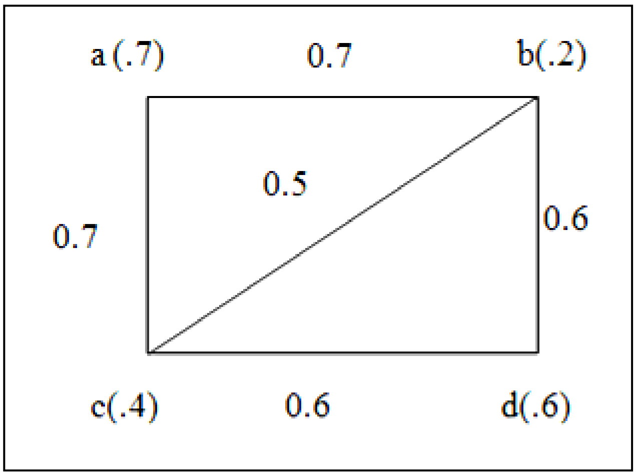

Figure 1: Anti Fuzzy Graph G_A

The strong edge adjacency matrix $({}^{e}A\mu)'$ is computed by considering the neighborhood weighted edges. It is given below.

$$({}^{e}A\mu) \quad \begin{array}{c|ccccc} & ab & ac & cd & cb & bd \\ \hline ab & .7 & .7 & 0 & 0 & 0 \\ ac & .7 & .7 & 0 & 0 & 0 \\ cd & 0 & .7 & .6 & 0 & 0 \\ cb & .7 & .7 & 0 & .5 & 0 \\ bd & .7 & 0 & 0 & 0 & .6 \end{array}$$

Figure 2: Strong Edge Adjacency Matrix of G_A

4. ANTI FUZZY LINE GRAPH OF $G_A(\sigma, \mu)$

In this topic, the anti fuzzy line graph $L(G_A)$ and its strong adjacency matrix $L({}^{e}A_{\mu})'$ are evaluated from given anti fuzzy graph G_A.

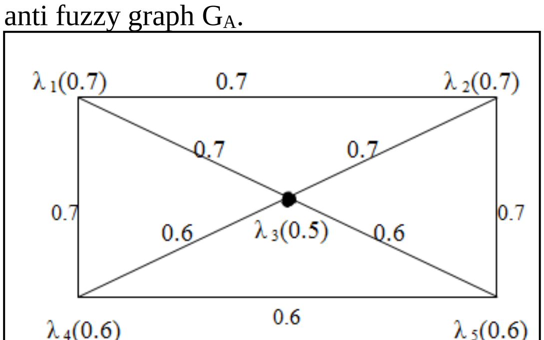

Figure 3: Anti Fuzzy Line Graph $L(G_A):(\lambda,\omega)$

From example -2, the line graph of G_A is computed from figure – 1. It consists of (λ,ω) such that,

λ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6}and ω = {λ_{12} / 0.7, λ_{14} / 0.7, λ_{13} / 0.7, λ_{23} / 0.7, λ_{34} / 0.6, λ_{25} / 0.7, λ_{35} / 0.6, λ_{45} / 0.6}.

The strong edge adjacency matrix $({}^eA_\mu)'$ of $L(G_A):(\lambda,\omega)$ is given below.

$L({}^eA\mu$

	λ_{12}	λ_{13}	λ_{14}	λ_{23}	λ_{25}	λ_{34}	λ_{35}	λ_{45}
λ_{12}	.7	.7	.7	.7	.7	0	0	0
λ_{13}	.7	.7	.7	.7	0	0	0	0
λ_{14}	.7	.7	.7	0	0	0	0	0
λ_{23}	.7	.7	0	.7	.7	0	0	0
λ_{25}	.7	0	0	.7	.7	0	0	0
λ_{34}	0	.7	.7	.7	0	.6	0	0
λ_{35}	0	.7	0	.7	.7	0	.6	0
λ_{45}	0	0	.7	0	.7	0	0	.6

Figure 4: Strong Edge Adjacency Matrix of $L(G_A)$

1.15. Properties 4.1

Every $L(G_A)$ is strong AFG. $L({}^eA_\mu)$ is a square symmetric matrix with all entries are the strong edges of $L(G_A)$.

The main diagonal of $L({}^eA_\mu)' = \mu(e_i)$.

Each e_i is specified by at least one fuzzy value corresponding to neighborhood to itself. That is, non zero row / column does not exist.

In $L({}^eA\mu)$, a i^{th} row contains q number of entries then the corresponding edge is a neighbor to at least q vertices in $L(G_A)$.

$\sum \mu(e_i)$ =Size of $L[G_A(\lambda,\omega)] = \sum(\omega(x,y))\ \forall x,y$ in λ (9)

Sum of each row and column are equal. That is

$$\sum R(e_i) = \sum C(e_j) \qquad (10)$$

$L({}^eA\mu)'$ is asymmetric matrix whose entries in main diagonal are $\mu(e_i)$.

In $L({}^eA\mu)'$, a i^{th} row contains q number of entries then the corresponding edge is a strong neighbor to q edges in $L(G_A)$. But the reverse part may differ.

5. EDGE DOMINATION ON ANTI FUZZY LINE GRAPH

The method of maxima algorithm is applied for computing edge and total domination number for anti fuzzy line graph. the EDN and TDN of Anti fuzzy graph and its line graphs are compared with each other.

1.16. Maxima Method Algorithm (MMA)

Construct the AFLG from the given anti fuzzy graph GA.

Compute strong edge adjacency matrix $L({}^eA\mu)'$.

Set dominating set D = φ.

Find $\sum R(e_i)$, $\sum C(e_i)$ and $\sum$(main diagonal) = S.

Select the maximum value in $C(e_i)$. If there exist a repeated value, choose an edge which have the maximum $\mu(e_i)$ in main diagonal.

Choose the maximum edge in the selected column as the first element of dominating set D.

Delete the selected edge with corresponding row and column. In row, delete the edges which are incident with strong edges in D. take it as $L({}^eA\mu)'1$.

If the reduced matrix $L({}^eA\mu)'1$ contains any row and column continue the process from step (4). Otherwise stop.

The resultant dominating set D of $L(G_A)$ are the minimal edge dominating set of AFLG.

1.17. Edge Dominating Number (EDN) of G_A

Consider the anti fuzzy graph $G_A(\sigma,\mu)$ from figure (1). It consists of σ = {a/0.7, b/0.2, c/0.4, d/0.6}and μ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6. The strong edge adjacency matrix of $G_A({}^eA\mu)'$ is given in Figure (2). The computation of dominating set is given below.

Set D = φ.
Compute $\sum R(e_i)$, $\sum C(e_i)$ in $({}^eA\mu)'$.

$$\sum R(e_i) = \begin{matrix} ab \\ ac \\ cd \\ cb \\ bd \end{matrix} \begin{pmatrix} 1.4 \\ 1.4 \\ 1.3 \\ 1.9 \\ 1.3 \end{pmatrix}$$

$$\sum C(e_i) = \begin{pmatrix} ab & ac & cd & cb & bd \\ 2.8^* & 2.8 & 0.6 & 0.5 & 0.6 \end{pmatrix}$$

C(ab) has the maximum value. Select (ab) as the member of dominating set. That is, D = {ab}.
Delete the selected column (ab) and the corresponding row (ab), (ac), (cb) and (bd).

The resultant matrix $(^eA\mu)'1$

ac	cd
0.7*	0.6

The above matrix has two columns then repeat the procedure. The edge (ac) has the maximum value.Then select (ac) as the member of D and delete the corresponding row of $(^eA\mu)'1$.
The matrix has no column. Stop the process.

The minimal edge dominating set of anti fuzzy graph (figure -1) is D (G_A) = {ab, ac}.

The EDN of anti fuzzy graph $G_A(\sigma, \mu)$is $\gamma' = 1.4$.

1.18. Edge Dominating Number (EDN) of L(G_A)

Consider the example -2, the line graph of G_A consists of (λ, ω) such that λ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6}and ω = {λ_{12} / 0.7, λ_{14} / 0.7, λ_{13} / 0.7, λ_{23} / 0.7, λ_{34} / 0.6, λ_{25} / 0.7, λ_{35} / 0.6, λ_{45} / 0.6}. The strong edge adjacency matrix of L[G_A] $(^eA\mu)'$ is given in Figure (4). The computation of dominating set is given below.

Set D = φ.

Compute ∑ R(e_i), ∑ C(e_i) in L$(^eA\mu)'$.

$$\sum R(e_i) = \begin{matrix} \lambda_{12} \\ \lambda_{13} \\ \lambda_{14} \\ \lambda_{23} \\ \lambda_{25} \\ \lambda_{34} \\ \lambda_{35} \\ \lambda_{45} \end{matrix} \begin{pmatrix} 3.5 \\ 2.8 \\ 2.1 \\ 2.8 \\ 2.1 \\ 2.7 \\ 2.7 \\ 2.0 \end{pmatrix}$$

$$\sum C(e_i) = \begin{matrix} \lambda_{12} & \lambda_{13} & \lambda_{14} & \lambda_{23} & \lambda_{25} & \lambda_{34} & \lambda_{35} & \lambda_{45} \\ [3.5 & 4.2* & 3.5 & 4.2 & 3.5 & 0.6 & 0.6 & 0.6] \end{matrix}$$

Select λ_{13} be the maximum value. D = { λ_{13}}.

Delete the selected column λ_{13} and its corresponding row λ_{12}, λ_{13}, λ_{14}, λ_{23}, λ_{34} and λ_{35}.

L$(^eA\mu)'1$ becomes,

	λ_{12}	λ_{13}	λ_{14}	λ_{23}	λ_{25}	λ_{34}	λ_{35}	λ_{45}	∑ R(ei)
λ_{25}	.7	0	0	.7	.7	0	0	0	2.1
λ_{45}	0	0	.	0	.7	0	0	.6	2.0
			7						
∑C(ei)	0.7	-	0.7	0.7	1.4*	-	-	0.6	4.1

Select λ_{25} is the member of dominating set and delete the column and its corresponding row. But the set D = {λ_{13}, λ_{25}}is isolated. Go to step 3.

From Step 3, select λ_{23} be the element in D then delete the corresponding row λ_{12}, λ_{13}, λ_{23}, λ_{25}, λ_{34} and λ_{35}. The

	λ_{12}	λ_{13}	λ_{14}	λ_{23}	λ_{25}	λ_{34}	λ_{35}	λ_{45}	∑ R(ei)
λ_{14}	7	7	7	0	0	0	0	0	2.1
λ_{45}	0	0	7	0	.7	0	0	.6	2.0
∑C(ei)	0.7	0.7	1.4*	0	0.7	-	-	0.6	4.1

resultant matrix

Therefore, D = {λ_{23}, λ_{14}} which is also isolated. Again go to step 3.

Select λ_{12} be the next maximum element. Choose it is the member of dominating set D, delete the column and its corresponding row. D = {λ_{12}}.

	λ_{12}	λ_{13}	λ_{14}	λ_{23}	λ_{25}	λ_{34}	λ_{35}	λ_{45}	∑ R(ei)
λ_{34}	0	.7	.7	.7	0	.6	0	0	2.7
λ_{35}	0	.7	0	.7	.7	0	.6	0	2.7
λ_{45}	0	0	.7	0	.7	0	0	.6	2.0
∑C(ei)	-	1.4	1.4	1.4	1.4	0.6	0.6	0.6	7.4

Select λ_{13} and delete the column with its corresponding row, then no column will exit in L$(^eA\mu)'$. D = {λ_{12}, λ_{13}, λ_{14}}.

The different edge dominating sets are, D = {λ_{12}, λ_{23}, λ_{14}}, {λ_{12}, λ_{25}, λ_{13}} and {λ_{12}, λ_{25}, λ_{23}}.

The EDN of anti fuzzy line graph L($G_A(\sigma, \mu)$)is $\gamma' = 2.1$.

1.19. Alternate Procedure

From step 6, the set D = {λ_{13}, λ_{25}}is isolated then select the next maximum λ_{12}. Because D = {ab, ac} = {λ_1, λ_2}. Obviously λ_{12} be the one of dominating set element. Choose D = {λ_{12}, λ_{13}}.

	λ12	**λ13**	**λ14**	**λ23**	**λ25**	**λ34**	**λ35**	**λ45**	**∑ R(ei)**
λ25	.7	0	0	.7	.7	0	0	0	2.1
λ45	0	0	.7	0	.7	0	0	.6	2.0
∑C(ei)	0.7*	-	0.7	0.7	1.4	-	-	0.6	4.1

Delete the column and its corresponding row then λ_{45} will be the remaining. Choose λ_{14}. Hence D = D = {λ_{12}, λ_{13}, λ_{14}}.

The EDN of anti fuzzy line graph $L(G_A(\sigma,\mu))$is $\gamma' = 2.1$.

1.20. Algorithm Modification

By the above experimental results, this algorithm can be included the following steps. This algorithm will reduce the repetition of computation steps. From step 6,

Select the maximum value in $C(e_i)$. If there exist a repeated value, choose an edge which have the maximum $\mu(e_i)$ in main diagonal.

If the elements of dominating set are isolated then choose the next maximum value in $C(e_i)$ and proceed the same.

Obviously, this computation gives the minimal edge dominating set by deleting the subsequent maximum terms of $C(e_i)$.

1.21. Total Dominating Number (TDN) of G_A

Consider the anti fuzzy graph $G_A(\sigma,\mu)$ from figure (1). It consists of σ = {a/0.7, b/0.2, c/0.4, d/0.6} and μ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6. The strong adjacency matrix of G_A (Mμ)' is given below.

(Mμ)' =

	a	b	c	d
a	.7	.7	.7	0
b	.7	.2	0	0
c	.7	0	.4	0
d	0	.6	.6	.6

Figure 5: Strong Adjacency Matrix of G_A

1.22. Total Dominating Number (TDN) of G_A

Compute ∑ $R(e_i)$, ∑ $C(e_i)$ in strong adjacency matrix (Mμ)'.

Reduce the matrix by deleting any row or column which are maximum.

	a	**b**	**c**	**d**	**∑ R(ei)**		
a	.7	.7	.7	0	2.1*	-	-
b	.7	.2	0	0	0.9	0.2	0.2
c	.7	0	.4	0	1.1	0.4	0.4*
d	0	.6	.6	.6	1.8	1.8*	-
∑ C(ei)	2.1	1.5	1.7	0.6	5.9		
	-	0.8	1	0.6		2.4	
	-	0.2	0.4	-			0.6

The minimal total dominating set D = {a,d,c}. The total domination number TDN, $\gamma_t(G_A) = 1.7$.

1.23. 5.7 Total Dominating Number (TDN) of $L(G_A)$

Consider the example -2, the line graph of G_A consists of (λ, ω) such that λ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6}and ω = {λ_{12} / 0.7, λ_{14} / 0.7, λ_{13} / 0.7, λ_{23} / 0.7, λ_{34} / 0.6, λ_{25} / 0.7, λ_{35} / 0.6, λ_{45} / 0.6}. The dominating set is computed by the strong adjacency matrix given below. Continue the process till the row and columns are deleted.

Mμ' =

	λ1	**λ2**	**λ3**	**λ4**	**λ5**	**∑ R(ei)**			
λ1	.7	.7	.7	.7	0	2.8	-	-	-
λ2	.7	.7	.7	0	.7	2.8	2.1	-	-
λ3	.7	.7	.5	0	0	1.9	1.2	0.5	0.5
λ4	.7	0	0	.6	0	1.3	0.6	0.6	-
λ5	0	.7	0	0	.6	1.3	1.3	0.6	0.6
	2.8	2.8	1.9	1.3	1.3	10.1			
∑ C(ei)	-	2.1	1.2	0.6	1.3		5.2		
	-	-	0.5	0.6	0.6			1.7	
	-	-	0.5	-	0.6				1.1

The minimal total dominating set D = { λ_1, λ_2, λ_4, λ_5}. The total domination number TDN, $\gamma_t(G_A) = 2.6$.

6. CONCLUSION

From figure (1), μ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6. From figure (4), λ = {ab/0.7, ac/0.7, cd/0.6, cb/0.5, bd/0.6}. Then there exist a one-one correspondence between the edge of $G_A(\sigma,\mu)$ and the vertices of $L(G_A):(\lambda,\omega)$.

If any vertex is common in the dominating set then the corresponding edge is must be a member of dominating set in anti fuzzy line graph.

That is, ab = λ_1 and ac = λ_2.Therefore λ_{12} be the obvious member of $D(L(G_A))$. If the procedure for searching the elements of dominating set is starts from this view, the other elements are identified easily.

Results / Graph	**$G_A(\sigma,\mu)$**	**$L(G_A):(\lambda,\omega)$**
Edge Dominating Set	{ab, ac}	{λ_{12}, λ_{13}, λ_{14}}
EDN γ'	1.4	2.1
Total Dominating Set	{a,d,c}	{λ_1, λ_2, λ_4, λ_5}
TDN γt (G_A)	1.7	2.6

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