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DOMINATION IN SOFT GRAPHS

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ABSTRACT

In this paper we introduce domination in soft graphs and some of their properties.

Keywords: *soft set, soft graphs, domination in soft graphs.*

1. INTRODUCTION

Soft set theory [1] was introduced by molodstov in 1999 as a general mathematical tool for dealing with uncertainties. The operation of soft sets are defined by maji *et al.* [2] rajesh k.thumbakara *et al.* have been introduced soft graph [4] & investigated some of their properties.

2. PRELIMINARIES

2.1 Soft sets:

Definition 2.21: [2] let U be a non empty finite set of objects is called universe and let E be a nonempty set called parameters.

An ordered pair (F,E) is said to be a soft set over U, Where F is a mapping from E into the set of all subsets of the set U. that is $F: E \to P(U)$. The set of all soft sets over U is denoted by S(U).

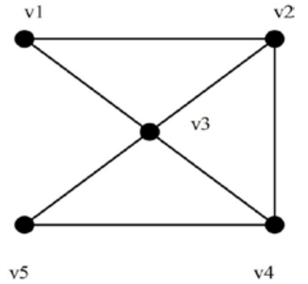
Definition 2.2.2: [4] Let (F, A) be a soft set over V. then (F, A) is said to be a soft graph of G if the sub graph induced by F(x) in G, F(x) is a connected sub graph of G for all $x \in A$.

The set of all soft graph of G is denoted by SG(G).

3. DOMINATION IN SOFT GRAPHS

Definition 3.1: A set D is said to be a dominating set of a soft graph (F, A) if for every $x \in A$, every vertices of $f(x)$ in V-D is adjacent to at least one vertex in D

Example 3.2: A graph G = (V, E) is



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Let A = {v_1, v_4, v_5}.define the set value function F by

F(x) = {y/x is adjacent to y}

F(v_1) = {v_2,v_3}, F(v_4) = {v_2,v_3,v_5}, F(v_5) = {v_2,v_3,v_4}

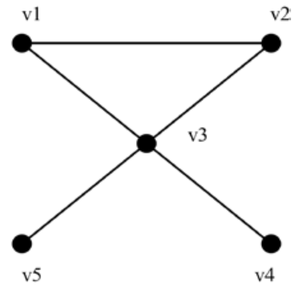
In this graph {v_2, v_3} is a dominating set.

Definition 3.3: A dominate set D of a soft graph is a minimal dominating set D' if no proper subset $D' \subset D$ is a dominating set. The dominating number $\gamma(F, A)$ of a soft graph (F, A) is the minimum cardinality of a dominating set of (F,A).

In the example 3.2, {v3} is a minimal dominating set of that soft graph

Proposition 3.4: Dominating set of a soft graph and dominating set of a graph (which gives that soft graph) are independent.

Example 3.5: A graph G is



Dominating set of G {v_1, v_3}.

Let A = {v_2,v_5}

Let $F(x) = \{y /$ is adjacent to $y\}$

F(v_2) = {v_1,v_3,v_5}

F(v_5) = {v_2,v_3}

{v_3} is a dominating set of a soft graph (F, A).

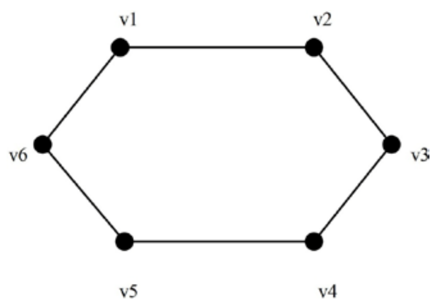
Theorem 3.6: A dominating set D of a soft graph is a minimal dominating set if for each $d \in A$, one of the following holds.

1. d is not adjacent to any vertex in D
2. there is a vertex $c \in D \ni: N(c) \cap D = \{d\}$, Where $N(c) = \{v \in V : V \in E\}$.

Theorem 3.7: For every soft graph (F, A) if D is a minimal dominating set then for every $x \in A$,$F(x) - D$ is a null graph.

Definition 3.8: An independent set of a soft graph (F, A) is a subset S of $V \ni:$ for every $x \in A \subseteq V$ no two vertices of F(x) are adjacent in (F,A).

Example 3.9: A graph G = (V, E) is



Let A = $\{v_1, v_4\}$

Let $F(x) = \{y / d(x, y) \le 2\}$
$\{v_2, v_3, v_5, v_6\}$ is the independent set of a soft graph (F, A).

Definition 3.10: For $n \ge 2$ a soft graph (F,A) is n-partite soft graph if A can be partitioned into n non-empty subsets $v_1, v_2, \ldots, v_n$ ∋: for every $x \in A$, no edge of f(x) joins vertices in the same set. The sets $v_1, v_2, \ldots, v_n$ are called partite sets of G.

Theorem 3.11: Let (F, A) be a soft graph which is not complete and $P \ge 4$. Then a set consisting of any two adjacent vertices of (F, A) forms a minimal dominating set of (F, A) iff (F, A) is soft isomorphic to the complete K-partite soft graph $K_{p1,p2,\ldots\ldots,pk}$ for some K and $P_i \ge 2$ for each i

Theorem 3.11: If D is an independent dominating set of a soft graph (F, A) then D is both a minimal dominating set of (F, A) and a maximal independent set of (F, A). conversely, if D is a maximal independent set of (F, A) then D is an independent dominating set of (F,A)

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