iJRASET

International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 Issue: II Month of publication: February 2017

DOI: <http://doi.org/10.22214/ijraset.2017.2028>

www.ijraset.com

Call: ☎ 08813907089

E-mail ID: ijraset@gmail.com

$\hat{\delta}\omega$ Closed Sets in Ideal Topological Space

V. Sree Rama Krishnan¹, R. Senthil Amutha²

Department of Mathematics, Sree Saraswathi Thyagaraja College, Pollachi, Coimbatore, Tamilnadu, India.

Abstract: In this paper the notion of $\hat{\delta}\omega$ closed sets is introduced and some of its basic properties are studied. This new class of sets is independent of semi-closed and closed sets. Also the relationship with some of the known closed sets is discussed.

Keywords: $\hat{\delta}\omega$ closed sets, closed sets, ω closed sets.

I. INTRODUCTION

Levine, velicko introduced the notions of generalized closed (briefly gclosed) and δ closed sets respectively and studied their basic properties. The notion of I_g closed sets was first introduced by Dontchev in 1999. Navaneetha Krishnan and Joseph further investigated and characterized I_g closed sets. Julian Dontchev and maximilian Ganster, Yuksel, Acikgoz and Noiri introduced and studied the notions of δ generalized closed (briefly δg closed) and δ -I-closed sets respectively. The purpose of this paper is to define a new class of sets called $\hat{\delta}\omega$ closed sets and also study some basic properties and characterizations.

Throughout this paper (X, τ, I) represents a ideal topological space on which no separation axiom is assumed unless otherwise mentioned. For a subset A of a ideal topological space X , $cl(A)$ and $int(A)$ denote the closure of A and the interior of A respectively. $X \setminus A$ or A^c denotes the complement of A in X . We recall the following definitions and results.

II. PRELIMINARIES

A. subset A of a space X is called

pre-open set if $A \subseteq intcl(A)$ and pre-closed set if $clint(A) \subseteq A$.

semi-open set if $A \subseteq clint(A)$ and semi-closed set if $intcl(A) \subseteq A$.

V.Sree Rama Krishnan. and R.Senthil Amutha

regular open set if $A = intcl(A)$ and regular closed set if $A = clint(A)$.

Π -open set if A is a finite union of regular open sets.

regular semi open if there is a regular open U such $U \subseteq A \subseteq cl(U)$

B. A subset A of (X, τ) is called

generalized closed set, if $cl(A) \subseteq U$, whenever $A \subseteq U$ and U is open in X .

regular generalized closed set, if $cl(A) \subseteq U$, whenever $A \subseteq U$ and U is regular open in X .

weakly generalized closed set, if $clint(A) \subseteq U$, whenever $A \subseteq U$ and U is open in X .

weakly closed set, if $cl(A) \subseteq U$ whenever $A \subseteq U$ and U is semi open in X .

regular weakly generalized closed set, if $clint(A) \subseteq U$, whenever $A \subseteq U$ and U is regular open in X .

regular weakly closed if $cl(A) \subseteq U$, whenever $A \subseteq U$ and U is regular semi open.

g -closed if $cl(A) \subseteq U$, whenever $A \subseteq U$ and U is w -open.

Let A and B be subsets of an ideal topological space (X, τ, I) . Then, the following properties holds.

$A \subseteq \sigma cl(A)$.

If $A \subset B$, then $\sigma cl(A) \subset \sigma cl(B)$.

$\sigma cl(A) = \bigcap \{ F \subset X \mid A \subset F \text{ and } F \text{ is } \delta-I\text{-closed} \}$.

If A is a δ -I-closed set of X for each $\alpha \in \Delta$, then $\bigcap \{ A\alpha/\alpha \in \Delta \}$ is δ -I-closed.

$\sigma cl(A)$ is δ -I-closed.

δ .I closure is $\{x \in X: int(cl^*(U)) \cap A \neq \emptyset, U \in I\}$.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

III. $\delta\omega$ - CLOSED SETS IN IDEAL TOPOLOGICAL SPACES

Definition 3.1 : A subset A of an ideal space (X, τ, I) is called $\delta\omega$ closed, if $\sigma cl(A) \subseteq U$, whenever $A \subseteq U$ and U is ω open.
Theorem 3.1

Every g-closed set in X is $\delta\omega$ -closed set in X .

Proof: Let A be an arbitrary g-closed set in the space X . Suppose $cl(A) \subseteq U$ whenever $A \subseteq U$ and U is open. i.e., $A \subseteq U$ and U is open. Then by the $\delta\omega$ - closed sets in ideal topological space

definition of $\delta\omega$ -closed set, if $\sigma cl(A) \subseteq U$, Whenever $A \subseteq U$ and U is ω open in X . Hence, the arbitrary element A of g-closed set belongs to U and also the arbitrary element A of $\delta\omega$ -closed set belongs to U . This implies A is a $\delta\omega$ - closed set.

The converse of the above theorem is not true, which is verified from the following example.

Example 3.1: Let $X = \{b, c, d\}$ be with topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$. Now if $cl(A) \subseteq U$, whenever $A \subseteq U$ and U is open in X . Then g-closed set will be $\{\phi, \{b\}, \{b, c\}, \{b, d\}, X\}$. Here, $A = \{c\}$ is a set. $\delta\omega$ -closed set but not g-closed.

Theorem 3.2

Every closed set in X is $\delta\omega$ -closed set in X .

Proof: Let A be an arbitrary closed set in the space X , every closed set is g-closed set and from the theorem 3.1, every g-closed set in X is $\delta\omega$ -closed. Thus every closed set in X is $\delta\omega$ -closed.

The converse of the above theorem is not true, which is verified from the following example.

Example 3.2: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$ and $\tau^c = \{\phi, \{b, d\}, \{b, c\}, \{b\}, X\}$. Thus, the closed set is $\{\phi, \{b, d\}, \{b, c\}, \{b\}, X\}$. Here $A = \{c, d\}$ is $\delta\omega$ -closed set but not closed set. **Theorem 3.3**

Every regular closed set in X is $\delta\omega$ -closed

Proof: Let A be an arbitrary regular closed set in the space X , every regular closed set is closed and from the theorem 3.1, every g-closed set in X is $\delta\omega$ -closed. This implies every regular closed set in X is $\delta\omega$ -closed.

The converse of the above theorem is not true, which is verified from the following example.

Example 3.3: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$ and $\tau^c = \{\phi, \{b, d\}, \{b, c\}, \{b\}, X\}$, the regular closed set, here is $\{\phi, \{b, d\}, \{b, c\}, X\}$. Then $A = \{c, d\}$ is $\delta\omega$ -closed set but not regular closed.

Theorem 3.4

Every regular generalized closed set in X is $\delta\omega$ -closed.

Proof: Let A be an arbitrary regular generalized closed set in the space X . Suppose $cl(A) \subseteq U$. Whenever $A \subseteq U$ and U is regular open. i.e., $A \subseteq U$ and U is regular open, every regular open set in X is open. Then by the definition of $\delta\omega$ -closed set, if $\sigma cl(A) \subseteq U$, whenever $A \subseteq U$ and U is ω open in X . Hence, the arbitrary element A of regular generalized closed set belongs to U and the arbitrary element A of $\delta\omega$ -closed set belongs to U . This implies that A is a $\delta\omega$ -closed set.

The converse of above theorem need not be true, which is verified from the following example.

Example 3.4: Let $X = \{b, c, d\}$ be with topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$ and $\tau^c = \{\phi, \{b, d\}, \{b, c\}, \{b\}, X\}$. Then if $cl(A) \subseteq U$, whenever $A \subseteq U$ and U is regular open in X . Then regular generalized closed set will be $\{\phi, \{b, d\}, \{b, c\}, \{c, d\}, \{b\}, X\}$. Here $A = \{c\}$ is a $\delta\omega$ -closed set but not regular generalized closed set.

Theorem 3.5

Every weakly generalized closed set in X is $\delta\omega$ -closed.

Proof: Let A be an arbitrary weakly generalized closed set in the space X . Then by definition of weakly generalized closed set and $\delta\omega$ -closed set the arbitrary element A of weakly generalized closed set belongs to U and the arbitrary element A of $\delta\omega$ -closed set belongs to U . This implies that A is a $\delta\omega$ -closed set.

The converse of the above theorem need not to be true, which is verified from the following example.

Example 3.5: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$. Now, if $cl(int(A)) \subseteq U$ whenever $A \subseteq U$ and U is open in X . Then wg-closed set will be $\{\phi, \{b, c\}, \{b, d\}, \{b\}, X\}$. Here $A = \{c\}$ is a $\delta\omega$ -closed set but not weakly generalized closed.

Theorem 3.6

Every semi closed set in X , is $\delta\omega$ -closed.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

$\delta\omega$ - closed sets in ideal topological space

5

Proof: Let A be an arbitrary semi closed set in the space X , every semi closed set is closed and from the theorem 3.1 every closed set in X is $\delta\omega$ -closed set. This implies, every semi closed set in X is $\delta\omega$ closedset.

The converse of the above theorem is not true, which is verified from the following example.

Example 3.6: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$. Then from the definition of semi closed set $\{\phi, \{b, d\}, \{b, c\}, X\}$. Here $A = \{c\}$ is $\delta\omega$ -closedset, but not semi-closed.

Theorem 3.7

Every weakly closed set in X is $\delta\omega$ -closed set.

Proof: Let A be a weakly closed set in the space X . Suppose $\text{cl}(A) \subseteq U$ When ever $A \subseteq U$ and U is semi open in X . i.e., when ever $A \subseteq U$ and U is semi Open, every semi open set is open in X . Then by the definition of $\delta\omega$ -closed set. if $\text{sc}l(A) \subseteq U$, whenever $A \subseteq U$ and U is ω open in X . Hence, the arbitrary element A of weakly closed set belongs to U and the arbitrary element A of $\delta\omega$ -closed set belongs to U . This implies that A is a $\delta\omega$ -closed set in X .

The converse of the above theorem need not to be true, which is verified from the following example.

Example 3.7: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$. Now if $\text{cl}(A) \subseteq U$, whenever $A \subseteq U$ and U is semiopen in X . Then $U = \{\phi, \{c\}, \{d\}, X\}$. Then weakly closed set will be $\{\phi, \{b\}, \{b, d\}, \{b, c\}, \{c, d\}, X\}$. Here $A = \{c\}$ is a closed set in $\delta\omega$ - closed set, but not Weakly X .

Theorem 3.8

Every regular weakly generalized closed set in X is $\delta\omega$ - closed.

Proof: Let A be a regular weakly generalized closed set in the space X . Suppose $\text{cl}(\text{int}(A)) \subseteq U$ whenever $A \subseteq U$ and U is open in X . i.e., $A \subseteq U$ and U is open, every regular open set in X is open. Then by the definition of $\delta\omega$ closed set, if $\text{sc}l(A) \subseteq U$, whenever $A \subseteq U$ and U is $\delta\omega$ open in X . Hence, the arbitrary element A of regular weakly generalized closed set belongs to U and the arbitrary element A of $\delta\omega$ -closed set belongs to U . This implies that A is a $\delta\omega$ -closed set in X .

example 3.8: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$. Now if $\text{cl}(\text{int}(A)) \subseteq U$, whenever $A \subseteq U$ and U is regular open in X . Then $U = \{\phi, \{c\}, \{d\}, X\}$. Then regular weakly generalized closed set will be $\{\phi, \{b\}, \{b, d\}, \{b, c\}, \{c, d\}, X\}$. Here $A = \{c\}$ is a set, $\delta\omega$ closed set but not regular weakly generalized.

Theorem 3.9

Every regular semi closed set in X is $\delta\omega$ closed set.

Proof: Let A be an arbitrary regular semi closed set in the space in X . Suppose $U \subseteq A \subseteq \text{cl}(U)$ whenever U is regular open set in X is open. i.e., U is open. Then by the definition of $\delta\omega$ -closed set, if $\text{sc}l(A) \subseteq U$, whenever $A \subseteq U$ and U is $\delta\omega$ open in X . Hence, the arbitrary element A of regular semi closed set belongs to U and the arbitrary element A of $\delta\omega$ -closed set belongs to U . Thus we can say that This implies that A is a $\delta\omega$ -closed set.

The converse of the above theorem need not to be true, which is verified from the following example.

Example 3.9: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$ and $\tau^c = \{\phi, \{b, d\}, \{b, c\}, \{b\}, X\}$. Then, from the definition of regular semi closed set is $\{\phi, \{c\}, \{d\}, \{b, d\}, \{b, c\}, \{c, d\}, X\}$. Here let $A = \{b\}$ is $\delta\omega$ -closed set but not regular semi closed.

Theorem 3.10

Every regular weakly closed set in X is $\delta\omega$ - closed.

Proof: Let A be an arbitrary regular weakly closed set in the space X , every semi open set is open and from the theorem 3.2, every closed set in X is $\delta\omega$ -closed set This implies that every regular weakly closed set in X is $\delta\omega$ -closed set

The converse of the above theorem is not true, which is verified using following example

$\delta\omega$ closed sets in ideal topological space

7

Example 3.10: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\phi, \{c\}, \{d\}, \{c, d\}, X\}$. Then by the definition of regular weakly closed set $\{\phi, \{c\}, \{d\}, \{b\}, \{b, c\}, \{b, d\}, X\}$. Here $A = \{c, d\}$ is $\delta\omega$ -closed set but not regular weakly closed.

Theorem 3.11

Every $*g$ -closed set in X is $\delta\omega$ - closed.

Proof: Let A be an arbitrary $*g$ -closed set in the space X . Suppose $\text{cl}(A) \subseteq U$, whenever $A \subseteq U$ and U is semi open X . i.e., whenever $A \subseteq U$ and U is semi open, every weakly open set is open in X . Then by the definition of $\delta\omega$ -closed set, if $\text{sc}l(A) \subseteq U$

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

U , whenever $A \subseteq U$ and U is ω open in X . Hence, the arbitrary element A of $\ast g$ -closed set belongs to U and the arbitrary element A of $\delta\omega$ closed set belongs to U . This implies that A of $\delta\omega$ - closed set in X .

the converse of the above theorem need not to be true, which is verified using following example.

Example 3.11: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\emptyset, \{c\}, \{d\}, \{c, d\}, X\}$. Now if $\text{cl}(A) \subseteq U$, whenever $A \subseteq U$ and U is weakly open in X . Then $U = \{\emptyset, \{c, d\}, \{c\}, \{b\}, \{d\}, X\}$. Then $\ast g$ closed set will be $\{\emptyset, \{b\}, \{b, d\}, \{b, c\}, X\}$. Here $A = \{c\}$ is a $\delta\omega$ closed set, but not $\ast g$ -closed set in X .

Theorem 3.12

Every θ -closed set in X is $\delta\omega$ -closed set.

Proof: Let A be an arbitrary θ -closed set in space X . Suppose $\text{cl}_\theta(A) \subseteq U$, whenever $A \subseteq U$ and U is open. i.e., $A \subseteq U$ and U is open. Then by the definition of $\delta\omega$ -closed set, if $\sigma\text{cl}(A) \subseteq U$, whenever $A \subseteq U$ and U is $\delta\omega$ open in X . Hence, the arbitrary element A of θ -closed set belongs to U and also the arbitrary element A of $\delta\omega$ -closed set belongs to U . This implies that, A is $\delta\omega$ closed.

The converse of the above theorem is not true, which is verified from the following example.

Example 3.12: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\emptyset, \{c\}, \{d\}, \{c, d\}, X\}$. Now if $\text{cl}_\theta(A) \subseteq U$, whenever $A \subseteq U$ and U is open in X . Then θ -closed set will be $\{\emptyset, \{b, c\}, \{b, d\}, \{b\}\}$. Here $A = \{c\}$ is a $\delta\omega$ -closed set, but not θ -closed set.

Theorem 3.13

Every δ -closed set in X is $\delta\omega$ -closed set in X .

Proof: Let A be an arbitrary δ -closed set in space X . Suppose $\text{cl}_\delta(A) \subseteq U$, whenever $A \subseteq U$ and U is open. i.e., $A \subseteq U$ and U is open. Then by the definition $\delta\omega$ -closed set, if $\sigma\text{cl}(A) \subseteq U$, whenever $A \subseteq U$ and U is ω open in X . Hence, the arbitrary element A of δ -closed set belongs to U and also the arbitrary element A of δ -closed set belongs to U . This implies that, A is a $\delta\omega$ closed.

The converse of the above theorem is not true, which is verified from the following example

Example 3.13: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\emptyset, \{c\}, \{d\}, \{c, d\}, X\}$. Now if $\text{cl}_\delta(A) \subseteq U$, whenever $A \subseteq U$ and U is open in X . Then δ -closed set will be $\{\emptyset, \{b, c\}, \{b, d\}, \{b\}\}$. Here $A = \{c\}$ is a $\delta\omega$ closed set, but not δ -closed.

IV. SOME OPERATIONS ON $\delta\omega$ - CLOSED SETS

Theorem 4.1

The union of two $\delta\omega$ closed sets of X is also an $\delta\omega$ -closed sets of X .

Proof: Assume that A and B are $\delta\omega$ - closed set in X . Let U be open in X , such that $A \cup B \subseteq U$. Thus $A \subseteq U$ and $B \subseteq U$. Since A and B are $\delta\omega$ - closed set so $\sigma\text{cl}(A) \subseteq U$ and $\sigma\text{cl}(B) \subseteq U$. Hence $\sigma\text{cl}(A \cup B) = \sigma\text{cl}(A) \cup \sigma\text{cl}(B) \subseteq U$. i.e., $\sigma\text{cl}(A \cup B) \subseteq U$. Hence $A \cup B$ is an $\delta\omega$ - closed set in X .

Theorem 4.2

If a subset A of X is $\delta\omega$ - closed in X , then $\sigma\text{cl}(A) \setminus A$ does not contain any non-empty open set in X .

Proof: Suppose that A is $\delta\omega$ -closed set in X . Let U be open set such that $\sigma\text{cl}(A) \setminus A \subseteq U$ and $U \neq \emptyset$. Now $U \subseteq \sigma\text{cl}(A) \setminus A$, i.e., $U \subseteq X \setminus A$ which implies that $A \subseteq X \setminus U$. As U is open, $X \setminus U$ is also open in X . Since A is an $\delta\omega$ $\delta\omega$ -Closed sets in ideal topological ω closed set in X , by definition of $\delta\omega$ -closed set, we have $\sigma\text{cl}(A) \subseteq X \setminus U$. So $U \subseteq X \setminus \sigma\text{cl}(A)$. Therefore $U \subseteq \sigma\text{cl}(A) \cap (X \setminus \sigma\text{cl}(A)) = \emptyset$ This show that $U = \emptyset$, which is contradiction. Hence $\sigma\text{cl}(A) \setminus A$ does not contain any nonempty open set in X .

Theorem 4.3

For an element $x \in X$, the set $X \setminus \{x\}$ is $\delta\omega$ - closed or ω open.

Proof: Let $x \in X$. Suppose $X \setminus \{x\}$ is not ω open. Then X is the only ω open set containing $X \setminus \{x\}$, which means that the only choice of ω open set containing $X \setminus \{x\}$ is X . i.e., $X \setminus \{x\} \subset X$. Also, we know $X \setminus \{x\}$ is not $\delta\omega$ -closed. To prove $X \setminus \{x\}$ is open. Suppose $X \setminus \{x\}$ is not open. As $X \setminus \{x\}$ is a subset of x and $X \setminus \{x\}$ only but $X \setminus \{x\}$ is not open. Thus the only open set in X . Also $\sigma\text{cl}(X \setminus \{x\}) \subset X$. Therefore by the definition of $\delta\omega$ - closed sets $X \setminus \{x\}$ is $\delta\omega$ - closed, which is a contradiction. Hence $X \setminus \{x\}$ is ω open.

Theorem 4.4

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

If A is an $\delta\omega$ -closed subset of X such that $A \subset B \subset \sigma\text{cl}(A)$, then B is an $\delta\omega$ -closed set in X .

Proof: Let A be an $\delta\omega$ -closed in X , such that $A \subset B \subset \sigma\text{cl}(A)$. Let U be open set such that $B \subset U$, then $A \subset U$. Since A is $\delta\omega$ -closed, we have $\sigma\text{cl}(A) \subset U$. Now as $B \subset \sigma\text{cl}(A)$. So $\sigma\text{cl}(B) \subset \sigma\text{cl}(\sigma\text{cl}(A)) \subset \sigma\text{cl}(A) \subset U$. Thus $\sigma\text{cl}(B) \subset U$, whenever $B \subset U$ and U is ω open. Therefore B is a $\delta\omega$ -closed in X .

Converse of the theorem is not true, which is verified from the following example.

Example 4.1: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\emptyset, \{c\}, \{d\}, \{c, d\}, X\}$ $\delta\omega$ -closed set is $\{\emptyset, \{c\}, \{d\}, \{b\}, \{b, c\}, \{c, d\}, \{b, d\}, X\}$. Now $\sigma\text{cl}(A) = \{d\}$ which is contained in each ω open set. $\sigma\text{cl}(B) = \{c\}$, which is also contained in each open set. Thus by the definition, A and B both are $\delta\omega$ -closed.

Theorem 4.5

If a subset A of a topological space X is both ω open and $\delta\omega$ -closed then it is ω closed.

Proof: Suppose a subset A of a topological space in X is both ω open and $\delta\omega$ -closed. Now $A \subset A$ then by definition of $\delta\omega$ -closed we have $\sigma\text{cl}(A) \subset A$. So $A \subset \sigma\text{cl}(A)$. Thus we have $\sigma\text{cl}(A) = A$. Finally A is open.

Theorem 4.6

If a subset A of a topological space X is both open and $\delta\omega$ -closed then it is closed.

Proof: Suppose a subset A of a topological space in X is both open and $\delta\omega$ -closed. Now $A \subset A$ then by definition of $\delta\omega$ -closed we have $\sigma\text{cl}(A) \subset A$. So $A \subset \sigma\text{cl}(A)$. Thus we have $\sigma\text{cl}(A) = A$. Finally A is open.

Theorem 4.7

In a topological space X if open of X are $\{X, \emptyset\}$, then every subset of X is an $\delta\omega$ -closed set.

Proof: Let X be topological space and open. i.e., $\{X, \emptyset\}$. Suppose A be any arbitrary subset of X , if $A = \emptyset$ then X is an $\delta\omega$ -closed set in X . If $A \neq \emptyset$ then X is the only open set containing A and so $\sigma\text{cl}(A) \subset X$. Hence by the definition A is $\delta\omega$ -closed in X .

The converse is not true, which is verified by following example.

Example 4.2: Let $X = \{b, c, d\}$ be with the topology $\tau = \{\emptyset, \{c\}, \{d\}, \{c, d\}, X\}$, every subset of X is an $\delta\omega$ -closed set in X . Thus for every subset of X is an $\delta\omega$ -closed set, we need not be open set only if $\{X, \emptyset\}$.

BIBLIOGRAPHY

- [1] M.E.Abd El-Monsef, S. Rose Mary and M.Lellis Thivagar, On G -closed sets in topological spaces, Assiut University Journal of Mathematics and Computer Science, Vol 36(1), P-P.43-51(2007).
- [2] H.Maki, R. Devi and K. Balachandran, Associated topologies of generalized α -closed sets and α -generalized closed sets, Mem. Fac. Sci.Kochi Univ. Ser. A. Math., 15(1994), 57-63.
- [3] J.Dontchev and M. Ganster, On δ -generalized closed sets and $T_{3/4}$ -spaces, Mem. Fac.Sci. Kochi Univ. Ser. A, Math., 17(1996),15-31.
- [4] M.Navaneethakrishnan, J. Paulraj Joseph, g -closed sets in ideal topological spaces, Acta Math. Hungar., 119(2008), 365-371.
- [5] M.Navaneethakrishnan, P.periyasamy, s. pious Missier, δ -closed sets in ideal topological spaces IOSR journal of mathematics volume 11, issue 1 ver. (jan-feb 2015).
- [6] O.Ravi, S.Tharmar, M. Sangeetha, J. Antony Rex Rodrigo, * g -closed sets in ideal topological spaces, Jordan Journal of Mathematics and statistics (JJMS) 6(1), 2013 PP. 1-13.
- [7] M.K.R.S. Veera Kumar, g -closed sets in topological spaces, Bull. Allah Math.Soc, 18(2003), 99-112.

10.22214/IJRASET

45.98

IMPACT FACTOR:
7.129

IMPACT FACTOR:
7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)