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A Comment on gpα-Closed Sets in Topoogical Spaces

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Abstract— In this paper, we will show that the notations of generalized pre α-closed(gpα-closed) set and pre-closed set are equivalent.

Keywords—*pre-closed sets, αspg-closed sets, gαb-closed sets,gpα-closed sets.*

I. INTRODUCTION

In 1970, N. Levin[9] initiated the study of generalized closed(briefly g-closed) sets in topological spaces. This concept was found to be useful and many results in general topology were improved. As a modification of g-closed sets, gp-closed sets are introduced and investigated by H. Maki et al.[10] Also, P. H. Patil and P. G. Patil[13] discussed and established the concept of generalised pre α-closed sets as a generalization of pre-closed sets. We will show that the concept of pre-closed set and a generalization of pre α-closed sets are same. Morever, we have established that the notations of gαb-closed[15] set and αspg-closed[14] set do not give rise to any notations in topological spaces.

II. PRELIMINARIES

A. *Definition Let (X, τ) be a topological space. A subset of X is said to be semi-preclosed[1] (=β-closed[3]) if $int(cl(int(A))) \subseteq A$ and semi-preopen(=β-open) if $A \subseteq cl(int(cl(A)))$.*

B. *Definition Let (X, τ) be a topological space. A subset A of X is said to be α-closed [12] if $cl(int(cl(A))) \subset A$ and α-open if $A \subset int(cl(cl(A)))$.*

C. *Definition Let (X, τ) be a topological space. A subset of X is said to be pre-closed [11] if $cl(int(A)) \subset A$ and pre-open if $A \subset int(cl(int(A)))$.*

D. *Definition Let (X, τ) be a topological space. A subset of X is said to be pre-closed [8]if $int(cl(A) \subset A$ and α-open if $A \subset cl(int(A)$.*

E. *Definition[10] Let (X, τ) be a topological space. A subset A of X is said to be a gp-closed set if $pCl(A) \subseteq G$ whenever $A \subseteq U$ and U is open in X.*

F. *Definition[13] Let (X, τ) be a topological space. A subset A of X is said to be a gpα-closed set if $pCl(A) \subseteq G$ whenever $A \subseteq U$ and U is a α-open in X.*

G. *Definition[15] Let (X, τ) be a topological space. A subset A of X is said to be a gαb-closed set if $bCl(A) \subseteq G$ whenever $A \subseteq U$ and U is a α-open in X.*

H. *Definition [14] Let (X, τ) be a topological space. A subset A of X is said to be αspg-closed set if $spCl(A) \subseteq G$ whenever $A \subseteq U$ and U is a α-open in X*

I. *Lemma [7]In every topological space (X, τ), each singleton is pre-open or nowhere dense.*

J. *Lemma[4] Let (X, τ)be a topological space, $A \subseteq X$ and $x \in X$. If {x} is nowhere dense, then {x} is α-closed and thus semi-closed, preclosed and β-closed.*

K *Theorem [5] Let (X, τ)be a topological space, $A \subseteq X$ and $x \in X$. Then $x \in pcl(A)$ if andonly if $A \cap U \neq \phi$ for every pre-open set U containming x.*

III. MAIN RESULTS

Theorem 3.1 Let (X, τ) be a topological space and $N \subseteq X$. Then the following are equivalent:
(i) N is pre-closed.
(ii) N is gpα-closed.
Proof: (i)$\Rightarrow$(ii) : Obvious, since every pre-closed set is gpα-closed.
By Lemma I. {u} is either pre-open or nowhere dense.
(a) If {u} is pre-open, then $\{u\} \cap N \neq \phi$ and hence $u \in N$.
(b) If {u} is nowhere dense. Then by Lemma J. {u} is

α-cl;osed. Hence X-{u} is α-open. Suppose that $u \notin N$, then $N \subseteq$ (X-{u}) and since N is gpα-closed, then we have pCl(N) $\subseteq$ (X-{u}). Thus $u \notin N$. Therefore pCl(N) $\subseteq$ N.

Remark 3.2 (1) Theorem 3.1 shows that the condition 'pCl(A) $\subset$ V whenever A $\subseteq$ V and V $\in$ αO(X)'does not define a new subset like generalized pre-colored set.

(2) Since SPC(X) $\subseteq$ BC(X) $\subseteq$ PC(X). Therefore, we can not obtain any new notions even if we replace pCl(A) in Theorem 3.1 with bcl(A) or spcl(A). This means that (1) The concept of b-closed set and a gαb-closed set are same and (2) The concepts of semi-preclosed set and a αspg-closed set are same.

IV. CONCLUSION

(1) The concept of pre-closed set and a generalized pre α-closed set are same.
(2) The concept of b-closed set and a generalized αb-closed set are same.
(3) The concept of semi-preclosed set and a αsemipregeneralized-closed set are same.

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Dr.J.B. Toranagatti pursed Ph.D. from Karnatak University ,Dharwad in 2018. He is currently working as Assistant Professor in Department of Mathematics,,Karnatak College,Dharwad since 2008. He has published more than 11 research papers in reputed international journals. His research areas of interest are General Topology, Soft Topology, Nano Topology and Fuzzy Topology. He has 14 years of teaching experience and 6 years of research experience.

