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$(i, j)-(g*p)**$-CLOSED SETS IN BITOPOLOGICAL SPACE

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ABSTRACT

*In this paper, we introduce a new class of sets called (i,j)- (g*p)** -closed sets which is properly placed in between the class of τ_j-closed sets and the class of (i,j)-(g*p)*-closed sets. As an application, we introduce four new spaces namely, (i,j) -${}_gT^{**}_p$,(i,j) -${}_{\alpha g}T^{**}_p$ and (i,j) - ${}_{gs}T^{**}_p$ spaces, and their properties are investigated.*

Keywords: *(i,j)-(g*p)**-closed sets, (i,j) -${}_gT^{**}_p$,(i,j) -${}_{\alpha g}T^{**}_p$ and (i,j) - ${}_{gs}T^{**}_p$ spaces.*

1. INTRODUCTION

A triple (X, τ_i, τ_j) where X is a non-empty set and τ_i and τ_j are topologies in X is called a bitopological space. Kelly [6] initiated the study of such spaces in 1985 and Fukutake [5] introduced the concepts of g-closed sets in bitopological spaces. Vadivel and Swaminathan [17] introduced and studied the concepts of g*p-closed sets in bitopological space in 2011. Pauline Mary Helen and Anitha [12] introduced $(i, j)-(g*p)*$-closed sets in 2014.

The purpose of the paper is to introduce the concept of (g*p)**-closed sets, (i,j)-${}_gT^{**}_p$, (i,j)-${}_{\alpha g}T^{**}_p$ and (i,j)-${}_{gs}T^{**}_p$ spaces.

2. PRELIMINARIES

Throughout this paper (X, τ_i, τ_j) represents non-empty bitopological space on which separation axioms are not assumed unless otherwise mentioned. For a subset A of a (X, τ_i, τ_j) space, cl(A) and int(A) denote the closure and the interior of A respectively.

The class of all closed subsets of a space of a space (X, τ_i, τ_j) is denoted by C(X, τ_i, τ_j) .

Definition 2.1: A subset A of a topological space (X, τ) is called

(1) a $pre-open$ set [10] if $A \subseteq \text{int}(cl(A))$ and a $pre-closed$ set if $cl(\text{int}(A)) \subseteq A$.

(2) a $semi-open$ set [8] if $A \subseteq cl(\text{int}(A))$ and a $semi-closed$ set if $\text{int}(cl(A)) \subseteq A$.

(3) a $semi-pre\,open$ set [2] (β-open [1]) if $A \subseteq cl(\text{int}(cl(A)))$ and a $semi-pre\,closed$ set [2] (β-closed [1])if $\text{int}(cl(\text{int}(A))) \subseteq A$.

(4) a $\alpha-open$ set [11] if $A \subseteq \text{int}(cl(\text{int}(A)))$ and a $\alpha-closed$ set [9] if $cl(\text{int}(cl(A))) \subseteq A$.

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Definition 2.2: A subset of a bitopology (X, τ_i, τ_j) is called

1. (i, j)-g-closed [5] if $\tau_j - cl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in τ_i.
2. (i, j)-sg-closed [3] if $\tau_j - scl(A) \subseteq U$ whenever $A \subseteq U$ and U is semi open in τ_i.
3. (i, j)-wg-closed [6] if $\tau_j - cl(\tau_i - \text{int}(A)) \subseteq U$ whenever $A \subseteq U$ and U is open in τ_i.
4. (i, j)- α^{**} -closed [18] if $\tau_j - cl(A) \subseteq U$ whenever $A \subseteq U$ and U is α^*-open in τ_i.
5. (i, j)-gs-closed[16] if $\tau_j - scl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in τ_i.
6. (i, j)-gsp-closed[4] if $\tau_j - spcl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in τ_i.
7. (i, j)- αg -closed [16] if $\tau_j - \alpha cl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in τ_i.
8. (i, j)-(g*p)*-closed [12] if $\tau_j - cl(A) \subseteq U$ whenever $A \subseteq U$ and U is g*p-open in τ_i.
9. (i, j)-g*p-closed [17] if $\tau_j - pcl(A) \subseteq U$ whenever $A \subseteq U$ and U is τ_i -g open.
10. (i, j)-gp-closed [116] if $\tau_j - pcl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in τ_i.
11. (i, j)- $g\alpha g$ -closed [13] if $\tau_j - cl(A) \subseteq U$ whenever $A \subseteq U$ and U is αg - open in τ_i.
12. (i, j)- $\alpha^* g$ -closed [14] if $\tau_j - cl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in τ_i.
13. (i, j)- g^* -closed [15] if $\tau_j - cl(A) \subseteq U$ whenever $A \subseteq U$ and U is g - open in τ_i.

Definition 2.3: A bitopological space (X, τ_i, τ_j) is called

1. an (i,j)- $T_\alpha{}^{**} - space$ [18]if every (i,j)- α^{**} -closed set is τ_j–closed.
2. an (i,j)- $T_b - space$ [16]if every (i,j)-gs-closed set is τ_j–closed.
3. an (i,j)- ${}_\alpha T_b - space$ [16]if every (i,j)- αg -closed set is τ_j–closed.

3. BASIC PROPERTIES OF $(i, j)-(g*p)^*$ - CLOSED SETS

In this chapter we introduce the concept of (i, j)-(g*p)**-closed sets in bitopological spaces.

Definition 3.1: A subset of a bitopological space (X, τ_i, τ_j) is said to be an (i,j)-(g*p)**-closed set if $\tau_j - cl(A) \subseteq U$ whenever $A \subseteq U$ and U is τ_i -(g*p)*-open.

Remark 3.2: By setting $\tau_i = \tau_j$ in definition (3.1),a (i,j)-(g*p)**-closed set is a (g*p)**-closed.

Proposition 3.3: Every τ_j–closed subset of (X, τ_i, τ_j) is (i,j)-(g*p)**-closed.

The converse of the above proposition is not true as seen in the following example.

Example 3.4: Let X={a,b,c}, $\tau_i = \{\phi, \{a\}, X\}$ and $\tau_j = \{\phi, \{c\}, X\}$.Then the set A ={a,c} is (i,j)-(g*p)*-closed but not τ_j -closed in (X, τ_i, τ_j).

Proposition 3.5: In bitopological space (X, τ_i, τ_j) every (i,j)-(g*p)**-closed set is (1) (i,j)- αg -closed (2) (i,j)-gs-closed (3) (i,j)-gp-closed (4) (i,j)-wg-closed (5) (i,j)-gsp-closed (6) (i,j)- $\alpha^* g$ -closed

The following examples show that the converses of the above results are not true.

Example 3.6: Let X= {a,b,c}, $\tau_i = \{\phi, \{c\}, \{a, c\}, X\}$ and $\tau_j = \{\phi, \{b\}, X\}$ .Then the set $A = \{c\}$ is (i,j)- αg -closed but not (i,j)-(g*p)**-closed.

Example 3.7: Let X= {a,b,c}, $\tau_i=\{\phi,\{a\},X\}$ and $\tau_j=\{\phi,\{c\},X\}$.Then the set $A=\{a\}$ is (i,j)-gs-closed but not (i,j)-(g*p)**-closed.

Example 3.8: Let X= {a,b,c}, $\tau_i=\{\phi,\{c\},\{a,c\},X\}$ and $\tau_j=\{\phi,\{a\},X\}$.Then the set $A=\{c\}$ is (i,j)-gp-closed but not (i,j)-(g*p)**-closed.

Example 3.9: Let X={a,b,c}, $\tau_i=\{\phi,\{c\},\{a,b\},X\}$ and $\tau_j=\{\phi,\{a\},X\}$ .Then the set $A=\{b\}$ is (i,j)-wg-closed but not (i,j)-(g*p)**-closed.

Example 3.10: Let X= {a,b,c}, $\tau_i=\{\phi,\{a\},X\}$ and $\tau_j=\{\phi,\{c\},X\}$.Then the set $A=\{a\}$ is (i,j)-gsp-closed but not (i,j)-(g*p)**-closed.

Proposition 3.11: Every (i,j)- $\alpha**$ - closed set is (i,j)-$(g*p)**$-closed set but not conversely.

Proof: Let A be a (i,j)-$\alpha**$-closed set. Let $A\subseteq U$ and U be $\tau_i-(g*p)*$- open .Then U is $\tau_i-\alpha*$–open. Since A is (i,j)-$\alpha**$-closed, $cl(A)\subseteq U$ therefore A is (i,j)-$(g*p)**$-closed.

Example 3.12: Let $X=\{a,b,c\}$ and $\tau_i=\{\varphi,X,\{a\}\}$ and $\tau_j=\{\varphi,X,\{c\}\}$ and let $A=\{a,c\}$. Then A is (i,j)-$(g*p)**$-closed but it is not (i, j)-$\alpha**$ - closed.

Proposition 3.13: Every (i,j)- $g\alpha g$ - closed set is (i,j)-$(g*p)**$-closed set but not conversely.

Proof: Let A be a (i, j)- $g\alpha g$ -closed set. Let $A\subseteq U$ and U be $\tau_i-(g*p)*$- open .Then U is $\tau_i-\alpha g$ –open. Since A is (i, j)- $g\alpha g$ -closed, $cl(A)\subseteq U$ therefore A is (i,j)-$(g*p)**$-closed.

Example 3.14: Let $X=\{a,b,c\}$ and $\tau_i=\{\varphi,X,\{a\}\}$ and $\tau_j=\{\varphi,X,\{c\}\}$ and let $A=\{a,c\}$. Then A is (i,j)-$(g*p)**$-closed but it is not (i,j)- $g\alpha g$ - closed.

Proposition 3.15: Every (i,j)- $g*$ - closed set is (i,j)-$(g*p)**$-closed set but not conversely.

Proof: Let A be a (i,j)- $g*$-closed set. Let $A\subseteq U$ and U be $\tau_i-(g*p)*$- open .Then U is τ_i-g –open. Since A is (i,j)- $g*$-closed, $cl(A)\subseteq U$ therefore A is (i,j)-$(g*p)**$-closed.

Example 3.16: Let $X=\{a,b,c\}$ and $\tau_i=\{\varphi,X,\{a\}\}$ and $\tau_j=\{\varphi,X,\{c\}\}$ and let $A=\{b\}$. Then A is (i,j)-$(g*p)**$-closed but it is not (i,j)- $g*$ - closed.

Remark 3.17: $(i,j)-g*p$ -closedness is independent of $(i,j)-(g*p)**$-closedness.

Example 3.18: Let $X=\{a,b,c\}$ and $\tau_i=\{\varphi,X,\{a\}\}$ and $\tau_j=\{\varphi,X,\{c\}\}$ and let $A=\{a\}$. Then A is $(i,j)-g*p$ - closed but it is not $(i,j)-(g*p)**$- closed.

Example 3.19: Let $X=\{a,b,c\}$ and $\tau_i=\{\varphi,X,\{c\},\{a,b\}\}$ and $\tau_j=\{\phi,X,\{a\}\}$ and let $A=\{a,c\}$. Then A is $(i,j)-(g*p)**$- closed but it is not $(i,j)-g*p$ - closed.

Remark 3.20: (i,j) - sg -closedness is independent of (i,j) - $(g*p)**$-closedness.

Example 3.21: Let $X = \{a,b,c\}$ and $\tau_i = \{\varphi, X, \{c\}, \{a,c\}\}$ and $\tau_j = \{\varphi, X, \{a\}\}$ and let $A = \{c\}$. Then A is $(i, j)-sg$ - closed but it is not $(i, j)-(g*p)**$ - closed.

Example 3.22: Let $X = \{a,b,c\}$ and $\tau_i = \{\varphi, X, \{a\}\}$ and $\tau_j = \{\varphi, X, \{c\}\}$ and let $A = \{c\}$. Then A is $(i, j)-(g*p)**$ - closed but it is not $(i, j)-sg$ - closed.

Proposition 3.23: If A and B are (i,j)-(g*p)**-closed .Then $A \cup B$ is also (i,j)-(g*p)**-closed.

Remark 3.24: The intersection of two (i,j)-(g*p)**-closed set need not be (i,j)-(g*p)**-closed as seen from the following example.

Example 3.25: Let X={a,b,c}, $\tau_i = \{\varphi, X, \{a\}\}$ and $\tau_j = \{\varphi, X, \{c\}\}$.Let A={a,b} and B={a,c}.Then A and B are (i,j)-(g*p)**-closed sets but $A \cap B = \{a\}$ is not (i,j)-(g*p)**-closed.

Remark 3.26: (i,j)-(g*p)**-closed set need not be (j,i)-(g*p)**-closed.

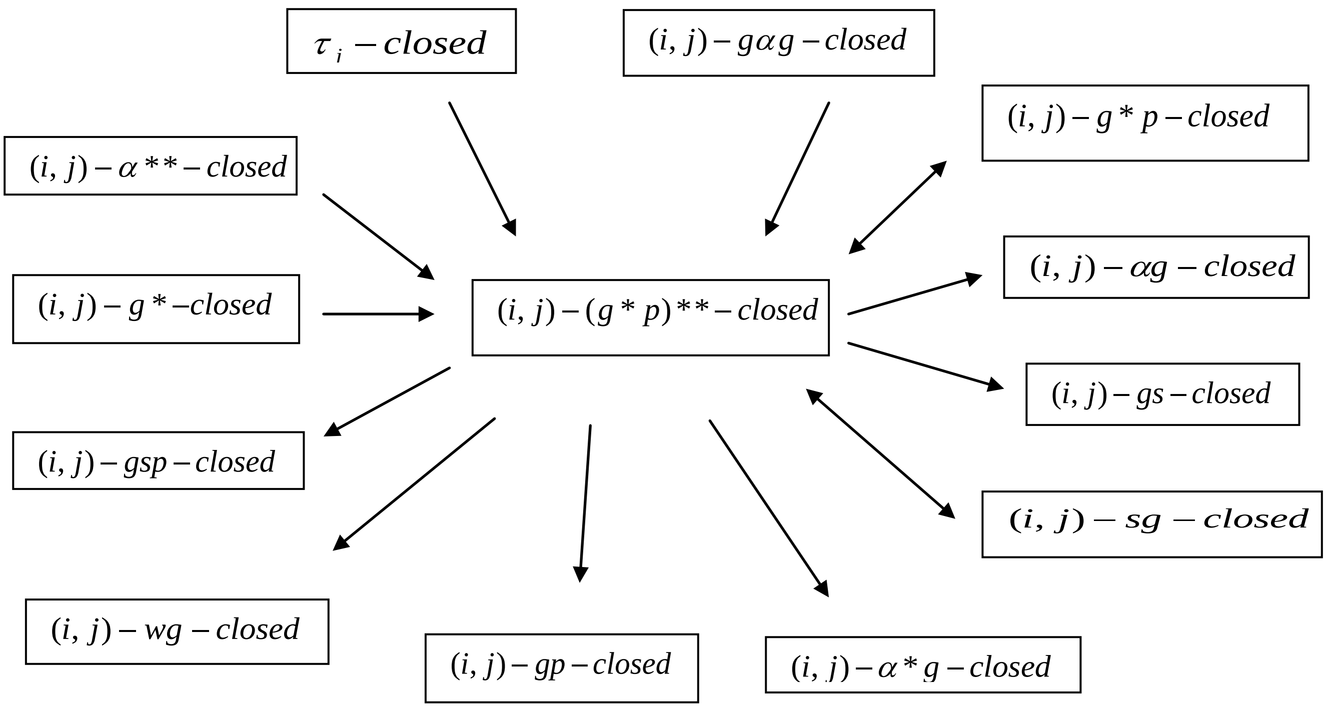
Example 3.27: Let X={a, b, c}, $\tau_i = \{\varphi, X, \{a\}\}$ and $\tau_j = \{\varphi, X, \{c\}\}$.Then the set $A = \{c\}$ is (i,j)-(g*p)**-closed but not (j,i)-(g*p)**-closed.

Proposition 3.28: If A is (i, j)-(g*p)**-closed ,then $\tau_j - cl(A) - A$ contains no non-empty τ_i -(g*p)*-closed set.

Proof: Let A be (i,j)-(g*p)**-closed and let F be a τ_i -(g*p)*-closed set such that F$\subseteq \tau_j - cl(A) - A$ Since A is (i, j)-(g*p)**-closed, we have $\tau_j - cl(A) \subseteq F^c$.

Therefore F$\subseteq (\tau_j - cl(A)) \cap (\tau_j - cl(A))^c = \phi$ .Therefore $F = \phi$.

The above results can be represented in the following figure.



Where A⟶ B (resp A ⟵|⟶ B) represents A implies B and B need not imply A (resp. A and B independent)

4. APPLICATIONS OF $(i,j)-(g*p)**$ - CLOSED SETS

We introduce the following definitions.

Definition 4.1: A bitopological space (X,τ_i,τ_j) is said to be an $(i,j)-{}_gT**_p$ - space if every $(i,j)-(g*p)**$ - closed set is τ_j - closed.

Definition 4.2: A bitopological space (X,τ_i,τ_j) is said to be an $(i,j)-{}_{\alpha g}T**_p$ - space if every $(i,j)-\alpha g-$ closed set is $(i,j)-(g*p)**$ -closed.

Definition 4.3: A bitopological space (X,τ_i,τ_j) is said to be an $(i,j)-{}_{gs}T**_p$ - space if every $(i,j)-gs-$ closed set is $(i,j)-(g*p)**$ -closed.

Theorem 4.4: Every $(i,j)-{}_\alpha T_b-$ space is $(i,j)-{}_gT**_p$ -space but not conversely.

Proof: Let (X,τ_i,τ_j) be a $(i,j)-{}_\alpha T_b-$ space. Let A be $(i,j)-(g*p)**$ -closed. Every $(i,j)-(g*p)**$ - closed set is $(i,j)-\alpha g-$ closed. Therefore A is $(i,j)-\alpha g-$ closed. Since (X,τ_i,τ_j) is a $(i,j)-{}_\alpha T_b-$ space, A is τ_j- closed. Therefore (X,τ_i,τ_j) is $(i,j)-{}_gT**_p$ -space.

Example 4.5: Let $X=\{a,b,c\}$ $\tau_i=\{\varphi, X,\{a\},\{c\},\{a,c\}\}$. $\tau_j=\{\varphi, X,\{a\},\{b\},\{a,b\}\}$. Then space (X,τ_i,τ_j) is $(i,j)-{}_gT**_p$ -space. $A=\{a,b\}$ is $(i,j)-\alpha g$ –closed but not τ_j- closed. Therefore the space (X,τ_i,τ_j) is not a $(i,j)-{}_\alpha T_b-$ space.

Theorem 4.6: Every $(i,j)-T_b-$ space is a $(i,j)-{}_gT**_p$ -space but not conversely.

Proof: Let (X,τ_i,τ_j) be a $(i,j)-T_b-$ space. Let A be $(i,j)-(g*p)**$ -closed. Every $(i,j)-(g*p)**$ - closed set is $(i,j)-gs-$ closed. Therefore A is $(i,j)-gs-$ closed. Since (X,τ_i,τ_j) is a $(i,j)-T_b-$ space, A is τ_j- closed. Therefore (X,τ_i,τ_j) is $(i,j)-{}_gT**_p$ -space.

Example 4.7: Let $X=\{a,b,c\}$ $\tau_i=\{X,\varphi,\{a\},\{c\},\{a,c\}\}$ and $\tau_j=\{X,\varphi,\{a\},\{b\},\{a,b\}\}$ .Then space (X,τ_i,τ_j) is $(i,j)-{}_gT**_p$ -space. $A=\{a\}$ is $(i,j)-gs-$ closed but not τ_j- closed. Therefore the (X,τ_i,τ_j) space is not $(i,j)-T_b-$ space.

Theorem 4.8: Every $(i,j)-{}_gT**_p$ space is a $(i,j)-T_\alpha**$ -space but not conversely.

Proof: Let (X,τ_i,τ_j) be a $(i,j)-T_b-$ space. Let A be $(i,j)-(g*p)**$ -closed. Every $(i,j)-(g*p)**$ - closed set is $(i,j)-gs-$ closed. Therefore A is $(i,j)-gs-$ closed. Since (X,τ_i,τ_j) is a $(i,j)-T_b-$ space, A is τ_j- closed. Therefore (X,τ_i,τ_j) is $(i,j)-{}_gT**_p$ -space.

Example 4.9: Let $X=\{a,b,c\}$ $\tau_i=\{X,\varphi,\{c\},\{a,b\}\}$ and $\tau_j=\{X,\varphi,\{a\}\}$ .Then space (X,τ_i,τ_j) is $(i,j)-T_\alpha**$ -space. $A=\{a,c\}$ is $(i,j)-(g*p)**$ -closed but not τ_j- closed. Therefore the (X,τ_i,τ_j) space is not $(i,j)-{}_gT**_p$ -space.

Theorem 4.10: Every $(i,j)-{}_{\alpha}T_b$ – space is a $(i,j)-{}_{\alpha g}T**_p$ -space but not conversely.

Proof: Let (X,τ_i,τ_j) be a $(i,j)-{}_{\alpha}T_b$ – space. Let A be a $(i,j)-\alpha g$ – closed. Then A is τ_j – closed, and hence A is $(i,j)-(g*p)**$ -closed. Therefore (X,τ_i,τ_j) is $(i,j)-{}_{\alpha g}T**_p$ -space.

Example 4.11: Let $X=\{a,b,c\}$ $\tau_i=\{X,\varphi,\{b\}\}$ and $\tau_j=\{X,\varphi,\{c\},\{a,c\}\}$ .Then space is a $(i,j)-{}_{\alpha g}T**_p$ -space. $A=\{a\}$ is $(i,j)-\alpha g$ –closed but not τ_j – closed. Therefore the space is not a $(i,j)-{}_{\alpha}T_b$ – space.

Theorem 4.12: Every $(i,j)-T_b$ – space is a $(i,j)-{}_{gs}T**_p$ -space but not conversely.

Proof: Let (X,τ_i,τ_j) be a $(i,j)-T_b$ – space. Let A be a $(i,j)-gs$ – closed. Then the A is τ_j – closed, and hence A is $(i,j)-(g*p)**$ -closed. Therefore (X,τ_i,τ_j) is a $(i,j)-{}_{gs}T**_p$ -space.

Example 4.13: Let $X=\{a,b,c\}$ $\tau_i=\{\varphi\ ,X,\{b\}\}$ and $\tau_j=\{X,\varphi,\{c\},\{a,c\}\}$. Then the space is a $(i,j)-{}_{gs}T**_p$ -space. $A=\{c\}$ is (i, j)-gs-closed but not τ_j – closed. Therefore the space is not a (i,j)- T_b space.

Proposition 4.14: A space which is both $(i,j)-{}_{\alpha g}T**_p$ - space and $(i,j)-{}_{g}T**_p$ -space is a (i,j)- ${}_{\alpha}T_b$ -space.

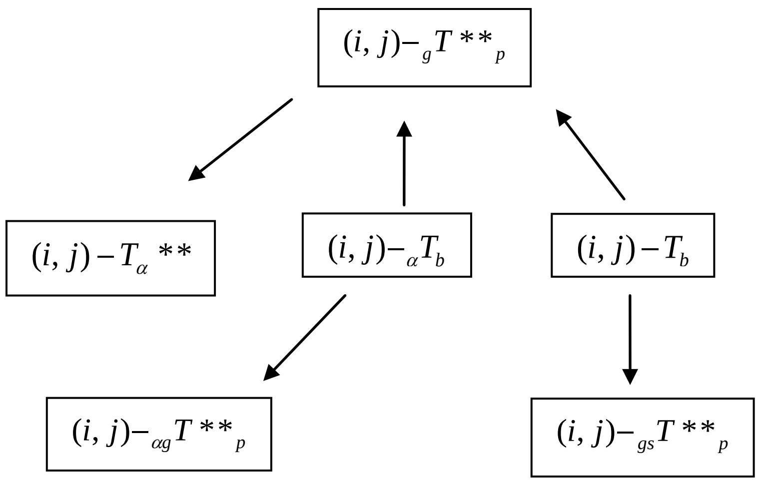
Proof: Let A be (i,j)- αg -closed. Then A is (i,j)- (g*p)**- closed. Since the space (X,τ_i,τ_j) is $(i,j)-{}_{\alpha g}T**_p$ -space. The space (X,τ_i,τ_j) is $(i,j)-{}_{g}T**_p$ -space, and hence A is τ_j -closed.
Therefore the space is (i,j)- ${}_{\alpha}T_b$ –space.

Proposition 4.15: A space which is both $(i,j)-{}_{gs}T**_p$ - space and $(i,j)-{}_{g}T**_p$ -space is a (i,j)- T_b -space.

Proof: Let A be (i,j)- gs-closed. Then A is (i,j)- (g*p)**- closed. Since (X,τ_i,τ_j) space is $(i,j)-{}_{gs}T**_p$ -space.

The space (X,τ_i,τ_j) is $(i,j)-{}_{g}T**_p$ -space, and hence A is τ_j - closed.
Therefore the space is a (i,j)- T_b – space.

The above results can be represented in the following figure.



where A ⟶ B represents A implies B and B does not imply A.

REFERENCES

1. Abd EI-Monsef,S.N.EI-Deeb and R.A.Mahmoud, β-open sets and β-continuous mappings, Bull. Fac. Sci. Assiut Univ., 12 (1983), 77-90.
2. Andrijevic.D, Semi-preopen sets,Mat. Vesnik, 38 (1) (1986), 24-32.
3. Devi.R. Balachandran.K and Maki.H, Semi generalized homeomorphisms and generalized semi-homeomorphisms, Indian, J.pure. appl (Math), 26 (1995), 271-284.
4. Dontchev.J. On generalizing Semi-pre open sets, Mem. Fac. Sic .Kochi. Univ. Ser .A. Math, 16 (1995), 35-48.
5. Fukutake.T, On generalized closed sets in bitopological spaces, Bull.Fukuoka.Univ.Ed.Part III, 35,(1986), 19-28.
6. Fukutake.T, Sundaram.P and Nagaveni.N, Bull.Fukuoka Univ.Ed part –III, 48 (1999), 33-40.
7. Kelly.J.C.Proc,London.Math,Sic, 13 (1963), 71-89.
8. Levine.N, Semi-open sets and semi-continuity in topological space,Amer.Math>Monthly, 70 (1963), 36-41.
9. Mashhour .A.S,I.A.Hasanein and S.N.EI-Deeb, α -continuous and α -open mappings., Acta Math. Hung., 41 (3-4) (1983), 213-218.
10. Mashhour. A.S, M.E.Abd EI-Monsef and S.N.EI.Deeb,On Pre-Continuous and weak pre-Continuous mappings, Pre-Continuous Mappings, Proc. Math. And Phys. Soc. Egypt, 53 (1982), 47-53.
11. Njastad. O, On Some Clases of neraly open sets, pacific J. Math., 15 (1965), 961-970.
12. Pauline Mary Helen.M, Anitha.P, (g*p)*-Closed Sets in Bitopological Space, International Journal of Mathematical Archive, 5 (8), 2014, 1-7.
13. Qays Hatem Imran, $g\alpha g$ -Closed Sets in Bitopological Space,International Research Journal of Pure Algebra, 4 (3), 2014, 419-425.
14. Qays Hatem Imran, $\alpha * g$ -Closed Sets in Bitopological Space, Journal of Kufa for Mathematics and Computer, Vol.2, no.1, May, 2014,PP. 95-102.
15. Sheik John.M and Sundaram.P, $g*$- Closed Sets in Bitopological Space, Indian J.Pure appl.Math., 35 (1), Janauary 2004, 71-80.
16. Tantawy.O.A.EI and Abu-Donia.H.M, Generalized Separation Axioms in Bitopological Space, The Arabian JI for Science and Engg, Vol 30, No 1A, 2005, 117-129.
17. Vadivel .A and Swaminathan.A , g*p-closed sets in bitopology, Journal of Advanced Studies in Topology, Vol. 3, No. 1, 2012, 81-88.
18. Veronica Vijayan, K.S.Sangeetha, α **-closed sets in topological spaces IJCA issue 3, volume 6,(November-December 2013)ISSN:2250-1797.

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