W-R_0 SPACE IN MINIMAL g-CLOSED SETS OF TYPE1

G. Venkateswarlu[1], V. Amarendra Babu[2], K. Bhagya Lakshmi[3] and V.B.V.N. Prasad[4]

[1]Research scholar, Dravidian University, Kuppam, Chittore(District), A.P., India.
[2]Department of Mathematics, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur Dist., A.P., India.
[3]Department of Mathematics, K.I.T.S. Engineering College, Guntur (District) Andhra Pradesh, India.
[4] Department of Mathematics, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India

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ABSTRACT - *In this article we introduce and study Weakly minimal closes sets of Type1-R_0 spaces, Weakly minimal g-closed sets of Type1-R_0 spaces, Weakly minimal closed sets of Type1-i-R_0 spaces, Weakly minimal closed sets of Type1-d-R_0 spaces, Weakly minimal closed sets of Type1-b-R_0 spaces, and also discuss the inter-relationships among separation properties along with several counter examples.*

***Key Wards**:* minimal open sets, minimal g-open sets, minimal open sets of Type1, minimal g-open set of Type1.

1. INTRODUCTION.

L.Nachbin[6] Topology and order, D.Van Nostrand Inc., Princeton, New Jersy studied increasing [resp. decreasing, balanced] open sets in 1965. K. Bhagya Lakshmi, J. Venkateswara Rao[13] studied W-R_0 Type spaces in topological ordered spaces in 2014. G.Venkareswarlu, V.Amarendra Babu, and M.K.R.S Veera kumar [11] introduced and studied minimal open sets of Type1 sets, minimal g-open sets of Type1 sets in 2016. G.Venkateswarlu, V.Amarendra Babu, K. Bhagya Lakshmi and V.B.V.N. Prasad [14] studied W-C_0 Spaces in 2019.

In this article we introduce new separation axioms of type Weakly- minimal closed sets Type1-R_0 spaces, Weakly minimal g-closed sets of Type1-R_0 spaces, Weakly minimal g- closed sets of Type1-i-R_0 spaces, Weakly minimal g- closed sets of Type1-d-R_0 spaces, Weakly minimal g- closed sets of Type1-b-R_0 spaces, and discuss the inter-relationships among separation properties along with several counter examples.

2. PRELIMINARIES.

DEFINITION 2.1[11]: In a topological space (X, T), an open sub set U of X is called a minimal open sets of Type! If ∃ at least one non-empty closed set F such that F⊆U or U = Φ.

DEFINITION 2.2[11]: In a topological space (X, T), an open sub set U of X is called a minimal g- open sets of Type! If ∃ at least one non-empty g- closed set F such that F⊆U or U = Φ.

3. MAIN RESULT:

Now we state and prove our first main result. Before that we first introduce the following definitions and notations.

Note:

The collections of all increasing Weakly-minimal closed sets of Type1, increasing Weakly-minimal g-closed sets Type1 is denoted by W-i-m_i^{cl}(Z, T1), W-i-m_i-g^{cl}(Z, T1). [resp. decreasing and balanced is denoted by W-d-m_i^{cl} (Z, T1), W-d-m_i-g^{cl}(Z, T1), W-b-m_i^{cl}(Z, T1), W-b-m_i-g^{cl} (Z, T1)]. Topological ordered space is denoted by TOS, Weakly-Minimal closed sets of Type 1, Weakly-Minimal g-closed sets of Type 1, set is denoted by W- m_i^{cl}(Z, T1), W-m_i-g^{cl} (Z, T1) and α-closed, β-closed, Ψ-closed is denoted by α^{cl},β^{cl}, Ψ^{cl}.

WE INTRODUCE THE FOLLOWING DEFINITIONS:

DEFINITION 3.1: In a topological space (Z, T), a non empty closed subset F of Z is called a minimal closed sets of Type1 if ∃ at least one nom-empty open set U such that F⊆U or U=Z.

DEFINITION 3.2: In a topological space (Z, T), a non empty g- closed subset F of Z is called a minimal g- closed sets of Type1 if ∃ at least one nom-empty g- open set U such that F⊆U or U=Z.

DEFINITION 3.3: A space (Z, T) is called a minimal closed sets of Type1 R_0-space if m_i^{cl}{x} contained in G where G is Minimal closed sets of Type1(brifly m_i^{cl}{x}) and x∈G∈T

DEFINITION 3.4: A space (Z, T) is called a minimal g-closed sets of Type1 R_0-space if m_i-g^{cl}{x} contained in G where G is Minimal g-closed sets of Type1(brifly m_i-g^{cl}{x}) and x∈G∈T

DEFINITION 3.5: A space (Z, T) is called a minimal g-closed sets of Type1 α-R_0-space if for x∈G∈m_i-g-O(Z, T) αm_i-g^{cl}{x} contained in G where G is Minimal g-closed sets of Type1(brifly m_i-g^{cl}{x}) and x∈G∈T

DEFINITION 3.6: A space (Z, T) is called a minimal g-closed sets of Type1 Ψ-R_0-space if for x∈G∈m_i-g-O(Z, T) Ψm_i-g^{cl}{x} contained in G where G is Minimal g-closed sets of Type1(brifly m_i-g^{cl}{x}) and x∈G∈T

DEFINITION 3.7: A space (Z, T) Called Weakly minimal closed sets of Type1--R_0 if the intersection of micl{x} is non-empty set ∀ x∈Z

DEFINITION 3.8: A space (Z, T) Called Weakly minimal g-closed sets of Type1--R_0 if the intersection of mi-g^{cl}{x} is non-empty set ∀ x∈Z

DEFINITION 3.9: A space (Z, T) Called Weakly minimal closed sets of Type1-i-R_0 if the intersection of i-m_i^{cl}{x} ia non-empty set ∀ x∈Z

DEFINITION 3.10: A space (Z, T) Called Weakly minimal g-closed sets of Type1-i-R_0 if the intersection of i-m_i-g^{cl}{x} is non-empty set ∀ x∈Z

DEFINITION 3.11: A space (Z, T) Called Weakly minimal closed sets of Type1-d--R_0 if the intersection of d-m_i^{cl}{x} non-empty set ∀ x∈Z

DEFINITION 3.12: A space (Z, T) Called Weakly minimal g-closed sets of Type1-d--R_0 if the intersection of d-m_i-g^{cl}{x} is non-empty set ∀ x∈Z

DEFINITION 3.13: A space (Z, T) Called Weakly minimal closed sets of Type1-b--R_0 if the intersection of b-m_i^{cl}{x} non-empty set ∀ x∈Z

DEFINITION 3.14: A space (Z, T) Called Weakly minimal g-closed sets of Type1-b-R_0 if the intersection of b-m_i-g^{cl}{x} is non-empty ∀ x∈Z

THEOREM 3.15: In a TOS (Z, T, ≤), every W- m_i-g^{cl}(Z, T1) – R_0 space is a W-α^{R0} space but not converse.

Proof: Suppose (Z, T) be a W- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of m_i-g^{cl}{x} is empty set ∀
x∈Z by fact, every m_i-g^{cl}(Z, T1)is a m_i^{cl}(Z, T1) and then every m_i^{cl}(Z, T1) is
α^{cl} set Then α^{cl}{x} contained in m_i-g^{cl}{x} ∀ x∈Z.
That implies the intersection of α^{cl}{x} contained in m_i-g^{cl}{x}. But the intersection of m_i-g^{cl}{x} empty set x∈Z
we get the intersection of α^{cl}{x} is empty set x∈Z. Hence (Z, T) is W- α^{R0} space.

EXAMPLE 3.16: Let Z = {ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1 } }.
m_i-g^{cl}(Z, T1) are Φ, Z
α^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}
m_i-g^{cl}{ζ_1} is Z
m_i-g^{cl}{δ_2} is Z
m_i-g^{cl}{Ω_3} is Z
The intersection of m_i-g^{cl}{x} is Z ∀ x∈Z
α^{cl}{ζ_1} is Z
α^{cl}{δ_2} is {δ_2}
α^{cl}{Ω_3} is {Ω_3}
The intersection of α^{cl}{x} is empty set not equal to Z ∀ x∈Z

THEOREM 3.17: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-iα^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-g^{cl}{x} is empty
∀ x∈Z by fact, everyi- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is
iα^{cl} set Then iα^{cl}{x} contained in i-m_i-g^{cl}{x} ∀ x∈Z.
That implies the intersection of iα^{cl}{x} contained ini- m_i-g^{cl}{x}. But the intersection of i-m_i-g^{cl}{x} empty set ∀x∈Z.
we get the intersection of iα^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-iα^{R0} space.

EXAMPLE 3.18: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {ζ_1, Ω_3} }.
$\leq_4$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2) }, (Ω_3, ζ_1), (Ω_3, δ_2) }.
m_i-g^{cl}(Z, T1) are Φ, Z, {ζ_1}, {δ_2, Ω_3}
i-m_i-g^{cl}(Z, T1) are Φ, Z
α^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}.
iα^{cl} sets are Φ, Z, {δ_2}.
i-m_i-g^{cl}{ζ_1} is Z
i-m_i-g^{cl}{δ_2} is Z
i-m_i-g^{cl} {Ω_3} is Z
The intersection of i- m_i-g^{cl}{x} is Z ∀ x∈Z
iα^{cl}{ζ_1}is Z
iα^{cl}{δ_2} is {δ_2}
iα^{cl}{Ω_3} is Z
The intersection of iα^{cl}{x} is {δ_2} not equal to Z ∀ x∈Z

THEOREM 3.19: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-dα^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-g^{cl}{x} is empty
∀ x∈Z by fact, every d- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is
dα^{cl} set Then dα^{cl}{x} contained in d-m_i-g^{cl}{x} ∀ x∈Z.
That implies the intersection of dα^{cl}{x} contained in d- m_i-g^{cl}{x}. But the intersection of d-m_i-g^{cl}{x} empty set ∀x∈Z.
we get the intersection of dα^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-dα^{R0} space.

EXAMPLE 3.20: Let Z={ζ_1, δ_2, Ω_3} and T= { Φ, Z, {ζ_1}, {ζ_1, Ω_3} }.
$\leq_2$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2) }, (Ω_3, δ_2) }.
m_i-g^{cl}(Z, T1) are Φ, Z
d-mi-g^{cl}(Z, T1) are Φ, Z
α^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}.
dα^{cl} sets are Φ, Z, {Ω_3}.
d-m_i-g^{cl}{ζ_1} is Z
d-m_i-g^{cl}{δ_2} is Z
d-m_i-g-^{cl}{Ω_3} is Z
The intersection of d-m_i-g^{cl}{x} is Z ∀ x∈Z
dα^{cl}{ζ_1} is Z
dα^{cl}{δ_2} is Z
dα^{cl}{Ω_3} is {Ω_3}
The intersection of dα^{cl}{x} is {Ω_3} not equal to Z ∀ x∈Z

THEOREM 3.21: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-bα^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-g^{cl}{x} is empty ∀ x∈Z by fact, every b- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is bα^{cl} set Then bα^{cl}{x} contained in b-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of bα^{cl}{x} contained in b- m_i-g^{cl}{x}. But the intersection of b-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of bα^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-bα^{R0} space.

EXAMPLE 3.22: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}, {δ_2, Ω_3} }.
$\leq_9$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, Ω_3) } }.
m_i-g^{cl}(Z, T1) are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}
b-mi-g^{cl}(Z, T1) are Φ, Z
α^{cl} sets are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
bα^{cl} sets are Φ, Z, {ζ_1, Ω_3}.
b-m_i-g^{cl}{ζ_1} is Z
b-m_i-g^{cl}{δ_2} is Z
b-m_i-g^{cl}{Ω_3} is Z
The intersection of b-m_i-g^{cl}{x} is Z ∀ x∈Z
bα^{cl}{ζ_1} is {ζ_1, Ω_3}
bα^{cl}{δ_2} is Z
bα^{cl}{Ω_3} is {ζ_1, Ω_3}
The intersection of bα^{cl}{x} is {ζ_1, Ω_3} not equal to Z ∀ x∈Z

THEOREM 3.23: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-bα^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-g^{cl}{x} is empty ∀ x∈Z by fact, every i- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is bα^{cl} set Then bα^{cl}{x} contained in i-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of bα^{cl}{x} contained in i- m_i-g^{cl}{x}. But the intersection of i-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of bα^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-bα^{R0} space.

EXAMPLE 3.24: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1} }.
$\leq_9$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, Ω_3) } }.
m_i-g^{cl}(Z, T1) are Φ, Z
i-mi-g^{cl}(Z, T1) are Φ, Z
α^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}.
b α^{cl} sets are Φ, Z, {δ_2}.
i-m_i-g^{cl}{ζ_1} is Z
i-m_i-g^{cl}{δ_2} is Z
i-m_i-g^{cl}{Ω_3} is Z
The intersection of i-m_i-g^{cl}{Zx is Z ∀ x∈Z.
bα^{cl}{ζ_1} is Z
bα^{cl}{δ_2} is {δ_2}
bα^{cl}{Ω_3} is Z
The intersection of bα^{cl}{x} is {δ_2} not equal to Z ∀ x∈Z.

THEOREM 3.25: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-dα^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-g^{cl}{x} is empty ∀ x∈Z by fact, every i- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is dα^{cl} set Then dα^{cl}{x} contained in i-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of dα^{cl}{x} contained in i- m_i-g^{cl}{x}. But the intersection of i-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of dα^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-dα^{R0} space.

EXAMPLE3.26: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}, {ζ_1, Ω_3} }.
$\leq_1$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2), (ζ_1, Ω_3), (δ_2, Ω_3) }
m_i-g^{cl}(Z, T1) are Φ, Z, {δ_2}, {Ω_3}, {ζ_1, Ω_3}
i-mi-g^{cl}(Z, T1) are Φ, Z, {Ω_3}
α^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
d α^{cl} sets are Φ, Z
i-m_i-g^{cl}{ζ_1} is Z
i-m_i-g^{cl}{δ_2} is Z
i-m_i-g^{cl}{Ω_3} is {Ω_3}
The intersection of i-m_i-g^{cl}{x} is {Ω_3} ∀ x∈Z.
d$\alpha^{c;}${ζ_1} is Z
dα^{cl}{δ_2} is Z
dα^{cl}{Ω_3}is Z
The intersection of dα^{cl}{x} is Z not equal to {Ω_3} ∀ x∈Z.

THEOREM 3.27: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-iα^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-g^{cl}{x} is empty ∀ x∈Z by fact, every b- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is iα^{cl} set Then iα^{cl}{x} contained in b-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of iα^{cl}{x} contained in b- m_i-g^{cl}{x}. But the intersection of b-m_i-g^{cl}{x}
empty set ∀x∈Z.
we get the intersection of iα^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-iα^{R0} space.

EXAMPLE 3.28: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}, {δ_2, Ω_3} }.
$\leq_1$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2) }, (ζ_1, Ω_3), (δ_2, Ω_3) }.
m_i-g^{cl}(Z, T1) are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}
b-mi-g^{cl}(Z, T1) are Φ, Z
α^{cl} sets are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
iα^{cl} sets are Φ, Z, {Ω_3}, {δ_2, Ω_3}
b-m_i-g^{cl}{ζ_1} is Z
b-$m_i$gcl{δ_2} is Z
b-$m_i$gcl{Ω_3} is Z
The intersection of b-m_i-g^{cl}{x} is Z ∀x∈Z.
iα^{cl}{ζ_1} is {ζ_1}
iα^{cl}{δ_2} is {δ_2, Ω_3}
iα^{cl}{Ω_3} is {Ω_3}

The intersection of $i\alpha^{cl}\{x\}$ is empty set not equal to Z ∀ x∈Z.

THEOREM 3.29: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-$d\alpha^{R0}$ space but not converse.
Proof. Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-$g^{cl}\{x\}$ is empty
∀ xϵZ by fact, every b- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is
$d\alpha^{cl}$ set Then $d\alpha^{cl}\{x\}$ contained in b-m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of $d\alpha^{cl}\{x\}$ contained in b- m_i-$g^{cl}\{x\}$. But the intersection of b-m_i-$g^{cl}\{x\}$
empty set ∀x∈Z.
we get the intersection of $d\alpha^{cl}\{x\}$ is empty set ∀ x∈Z Hence (Z, T) is W-$d\alpha^{R0}$ space.

EXAMPLE 3.30: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}, {δ_2, Ω_3} }.
$\leq_2$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2) }, (Ω_3, δ_2) }
m_i-g^{cl}(Z, T1) are Φ, Z, {δ_2}, {Ω_3}, {ζ_1, Ω_3}
b-m_i-g^{cl}(Z, T1) are Φ,Z
α^{cl} sets are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
$d\alpha^{cl}$ sets are Φ, Z, {ζ_1, Ω_3}
b-m_i-g^{cl}\{ζ_1\} is Z
b-m_i-g^{cl}\{δ_2\} is Z
b-m_i-g^{cl}\{Ω_3\} is Z
The intersection of b-m_i-$g^{cl}\{x\}$ is Z ∀x∈Z.
$d\alpha^{cl}$\{ζ_1\} is {ζ_1}
$d\alpha^{cl}$\{δ_2\} is Z
$d\alpha^{cl}$\{Ω_3\} is {Ω_3}
The intersection of $d\alpha^{cl}\{x\}$ is empty set not equal to Z ∀x∈Z.

THEOREM 3.31: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-$i\alpha^{R0}$ space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-$g^{cl}\{x\}$ is empty
∀ xϵZ by fact, every d- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is
$i\alpha^{cl}$ set Then $i\alpha^{cl}\{x\}$ contained in d-m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of $i\alpha^{cl}\{x\}$ contained in d- m_i-$g^{cl}\{x\}$. But the intersection of d-m_i-$g^{cl}\{x\}$
empty set ∀x∈Z.
we get the intersection of $i\alpha^{cl}\{x\}$ is empty set ∀ x∈Z Hence (Z, T) is W-$i\alpha^{R0}$ space.

EXAMPLE 3.32: Let Z= { ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {ζ_1, Ω_3} }.
$\leq_3$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2), (ζ_1, Ω_3) }.
m_i-g^{cl}(Z, T1) are Φ, Z
d-mi-g^{ci}(Z, T1) are Φ,Z
α^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}
$i\alpha^{cl}$ sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}.
d-m_i-g^{cl}\{ζ_1\} is Z
d-m_i-g^{cl}\{δ_2\} is Z
d-m_i-g^{cl}\{Ω_3\} is Z
The intersection of d-m_i-g^{cl}\{Z\} is Z ∀x∈Z
$i\alpha^{cl}$\{ζ_1\} is Z
$i\alpha^{cl}$\{δ_2\} is {δ_2}
$i\alpha^{l}$\{Ω_3\} is {Ω_3}
The intersection of $i\alpha^{cl}\{x\}$ is empty set not equal to Z ∀x∈Z

THEOREM 3.33: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-$b\alpha^{R0}$ space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-$g^{cl}\{x\}$ is empty
∀ xϵZ by fact, every d- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is
$b\alpha^{cl}$ set Then $b\alpha^{cl}\{x\}$ contained in d-m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of $b\alpha^{cl}\{x\}$ contained in d- m_i-$g^{cl}\{x\}$. But the intersection of d-m_i-$g^{cl}\{x\}$
empty set ∀x∈Z.
we get the intersection of $b\alpha^{cl}\{x\}$ is empty set ∀ x∈Z Hence (Z, T) is W-$b\alpha^{R0}$ space.

EXAMPLE 3.34: Let Z = { ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}, {ζ_1, Ω_3} }.
$\leq_4$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (Ω_3, ζ_1), (Ω_3, δ_2) }.
m_i-g^{cl}(Z, T1) are Φ, Z, {δ_2}, {Ω_3}, {ζ_1, Ω_3}
d-mi-g^{cl}(Z, T1) are Φ,Z, {ζ_1, Ω_3]
α^{ci} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
$b\alpha^{cl}$ sets are Φ, Z
d-m_i-g^{cl}\{ζ_1\} is {ζ_1, Ω_3}
d-m_i-g^{cl}\{δ_2\} is Z
d-m_i-g^{cl}\{Ω_3\} is {ζ_1, Ω_3}
The intersection of d-$m_i$gcl{x} is {ζ_1, Ω_3} ∀x∈Z.
$b\alpha^{cl}$\{ζ_1\} is Z
$b\alpha^{cl}$\{δ_2\} is Z
$b\alpha^{cl}$\{Ω_3\} is Z
The intersection of $b\alpha^{cl}\{x\}$ is Z not equal to ζ_1, Ω_3} ∀x∈Z.

THEOREM 3.35: In a TOS (Z, T, ≤), every W- m_i-g^{cl}(Z, T1) – R_0 space is a W-β^{R0} space but not converse.

Proof: Suppose (Z, T) be a W- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of m_i-$g^{cl}\{x\}$ is empty set ∀
xϵZ by fact, every m_i-g^{cl}(Z, T1)is a m_i^{cl}(Z, T1) and then every m_i^{cl}(Z, T1) is
β^{cl} set Then $\beta^{cl}\{x\}$ contained in m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of $\beta^{cl}\{x\}$ contained in m_i-$g^{cl}\{x\}$. But the intersection of m_i-$g^{cl}\{x\}$ empty set xϵZ
we get the intersection of $\beta^{cl}\{x\}$ is empty set xϵZ.
Hence (Z, T) is W- β^{R0} space.

EXAMPLE 3.36: Let Z = { ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2} }.
m_i-g^{cl}(Z, T1) are Φ, Z
β^{cl} sets are Φ, Z, {ζ_1}, {δ_2}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
m_i-g^{cl}\{ζ_1\} is Z
m_i-g^{cl} \{δ_2\} is Z
m_i-g^{cl} \{Ω_3\} is Z
The intersection of m_i-$g^{cl}\{x\}$ is Z ∀x∈Z.
β^{cl}\{ζ_1\} is {ζ_1}
β^{cl}\{δ_2\} is {δ_2}

$\beta^{cl}\{\Omega_3\}$ is $\{\Omega_3\}$
The intersection of $\beta^{cl}\{x\}$ is empty set not equal to Z ∀x∈Z.

THEOREM 3.37: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-iβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-$g^{cl}\{x\}$ is empty ∀ x∊Z by fact, every i- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is iβ^{cl} set Then i$\beta^{cl}\{x\}$ contained in i-m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of i$\beta^{cl}\{x\}$ contained in i- m_i-$g^{cl}\{x\}$. But the intersection of i-m_i-$g^{cl}\{x\}$ empty set ∀x∈Z.
we get the intersection of i$\beta^{cl}\{x\}$ is empty set ∀ x∈Z Hence (Z, T) is W-iβ^{R0} space.

EXAMPLE 3.38: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {ζ_1, Ω_3} }.
$\leq_4$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2) }, (Ω_3, ζ_1), (Ω_3, δ_2) }.
m_i-g^{cl}(Z, T1) a re Φ, Z
i-mi-^{cl}g(Z, T1) are Φ, Z
β^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}.
Iβ^{cl} sets are Φ, Z, {δ_2}.
i-m_i-$g^{cl}\{\zeta_1\}$ is Z
i-m_i-$g^{cl}\{\delta_2\}$ is Z
i-m_i-$g^{cl}\{\Omega_3\}$ is Z
The intersection of i-m_i-$g^{cl}\{x\}$ is Z ∀x∈Z.
i$\beta^{cl}\{\zeta_1\}$ is Z
i$\beta^{cl}\{\delta_2\}$ is {δ_2}
i$\beta^{cl}\{\Omega_3\}$ is Z
The intersection of i$\beta^{cl}\{x\}$ is {δ_2} not equal to Z ∀x∈Z.

THEOREM 3.39: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-dβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-$g^{cl}\{x\}$ is empty ∀ x∊Z by fact, every d- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is dβ^{cl} set Then d$\beta^{cl}\{x\}$ contained in d-m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of d$\beta^{cl}\{x\}$ contained in d- m_i-$g^{cl}\{x\}$. But the intersection of d-m_i-$g^{cl}\{x\}$ empty set ∀x∈Z.
we get the intersection of d$\beta^{cl}\{x\}$ is empty set ∀ x∈Z Hence (Z, T) is W-dβ^{R0} space.

EXAMPLE 3.40: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1} },
$\leq_4$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2) }, (Ω_3, ζ_1), (Ω_3, δ_2) }.
m_i-g^{cl}(Z, T1) are Φ, Z
d-mi-g^{cl}(Z, T1) are Φ, Z
β^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}.
dβ^{cl} sets are Φ, Z, {Ω_3}.
d-m_i-$g^{cl}\{\zeta_1\}$ is Z
d-m_i-$g^{cl}\{\delta_2\}$ is Z
d-m_i-$g^{cl}\{\Omega_3\}$ is Z
The intersection of d-m_i-$g^{cl}\{x\}$ is Z ∀x∈Z.
d$\beta^{cl}\{\zeta_1\}$ is Z
d$\beta^{cl}\{\delta_2\}$ is {δ_2}
d$\beta^{cl}\{\Omega_3\}$ is Z
The intersection of d$\beta^{ck}\{x\}$ is {δ_2} not equal to Z ∀x∈Z.

THEOREM 3.41: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-bβ^{R0} space but not converse.
Proof. Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-$g^{cl}\{x\}$ is empty ∀ x∊Z by fact, every b- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is bβ^{cl} set Then b$\beta^{cl}\{x\}$ contained in b-m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of b$\beta^{cl}\{x\}$ contained in b- m_i-$g^{cl}\{x\}$. But the intersection of b-m_i-$g^{cl}\{x\}$ empty set ∀x∈Z.
we get the intersection of b$\beta^{cl}\{x\}$ is empty set ∀ x∈Z Hence (Z, T) is W-bβ^{R0} space.

EXAMPLE 3.42: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}, {δ_2, Ω_3} }.
$\leq_9$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, Ω_3) } }.
m_i-g^{cl}(Z, T1) are Φ, Z, {δ_2}, {Ω_3}, {ζ_1, Ω_3}
b-mi-g^{cl}(Z, T1) are Φ, Z, {δ_2}
β^{cl}sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
bβ^{cl} sets are Φ, Z, {δ_2}, {ζ_1, Ω_3}.
b-m_i-$g^{cl}\{\zeta_1\}$ is Z
b-m_i-$g^{cl}\{\delta_2\}$ = {δ_2}
b-m_i-$g^{cl}\{\Omega_3\}$ = Z
The intersection of b-m_i-$g^{cl}\{x\}$ is {δ_2} ∀x∈Z.
b$\beta^{cl}\{\zeta_1\}$ is {ζ_1, Ω_3}
b$\beta^{cl}\{\delta_2\}$ is {δ_2}
b$\alpha^{cl}\{\Omega_3\}$ is {ζ_1, Ω_3}
The intersection of b-βcl{x} is Φ not equal to{δ_2} ∀x∈Z.

THEOREM 3.43: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-bβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-$g^{cl}\{x\}$ is empty ∀ x∊Z by fact, every i- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is bβ^{cl} set Then b$\beta^{cl}\{x\}$ contained in i-m_i-$g^{cl}\{x\}$ ∀ x∈Z.
That implies the intersection of b$\beta^{cl}\{x\}$ contained in i- m_i-$g^{cl}\{x\}$. But the intersection of i-m_i-$g^{cl}\{x\}$ empty set ∀x∈Z.
we get the intersection of b$\beta^{cl}\{x\}$ is empty set ∀ x∈Z Hence (Z, T) is W-bβ^{R0} space.

EXAMPLE 3.44: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2, Ω_3} }.
$\leq_5$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, Ω_3), (δ_2, Ω_3) }
m_i-g^{cl}(Z, T1) are Φ, Z, {ζ_1}, {δ_2, Ω_3}
i-mi-g^{cl}(Z, T1) are Φ,Z,{δ_2, Ω_3}
β^{cl} sets are Φ, Z, {ζ_1}, {δ_2}, {Ω_3}, {ζ_1, δ_2}, {δ_2, Ω_3}, {ζ_1, Ω_3}
bβ^{cl} sets are Φ, Z
i-m_i-$g^{cl}\{\zeta_1\}$ is Z
i-m_i-$g^{cl}\{\delta_2\}$ is {δ_2, Ω_3}
i-m_i-$g^{cl}\{\Omega_3\}$ is {δ_2, Ω_3}
The intersection of i-m_i-$g^{cl}\{Z\}$ is {δ_2, Ω_3} ∀x∈Z.
b$\beta^{cl}\{\zeta_1\}$ is Z
b$\beta^{cl}\{\delta_2\}$ is Z
b$\beta^{cl}\{\Omega_3\}$ is Z
The intersection of b$\beta^{cl}\{x\}$ is Z not equal to {δ_2, Ω_3} ∀x∈Z.

THEOREM 3.45: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-dβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-g^{cl}{x} is empty
∀ x∊Z by fact, every i- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is
dβ^{cl} set Then dβ^{cl}{x} contained in i-m_i-g^{cl}{x} ∀ x∈Z.
That implies the intersection of dβ^{cl}{x} contained in i- m_i-g^{cl}{x}. But the intersection of i-m_i-g^{cl}{x} empty set ∀x∈Z.
we get the intersection of dβ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-dβ^{R0} space.

EXAMPLE 3.46: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {ζ_1, δ_2}, {ζ_1, Ω_3} }.
$\leq_1$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2), (ζ_1, Ω_3), (δ_2, Ω_3)}
m_i-g^{cl}(Z, T1) are Φ, Z, {δ_2}, {Ω_3}
i-mi-g^{cl}(Z, T1) are Φ, Z, {Ω_3}
β^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}
dβ^{cl} sets are Φ, Z
i-m_i-g^{cl}{ζ_1} is Z
i-m_i-g^{cl}{δ_2} is Z
i-m_i-g^{cl}{Ω_3} is {Ω_3}
The intersection of i-m_i-g^{cl}{x} is {Ω_3} ∀x∈Z.
dβ^{cl}{ζ_1} is Z
dβ^{cl}{δ_2} is Z
dβ^{cl}{Ω_3} isZ
The intersection of dβ^{cl}{x} is Z not equal to{Ω_3} ∀x∈Z.

THEOREM 3.47: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-iβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-g^{cl}{x} is empty
∀ x∊Z by fact, every b- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is
iβ^{cl} set Then iβ^{cl}{x} contained in b-m_i-g^{cl}{x} ∀ x∈Z.
That implies the intersection of iβ^{cl}{x} contained in b- m_i-g^{cl}{x}. But the intersection of b-m_i-g^{cl}{x}
empty set ∀x∈Z.

EXAMPLE 3.48: Let Z = { ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3} }.
$\leq_1$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (δ_2, ζ_1) }, (ζ_1, Ω_3), (δ_2, Ω_3) }.
m_i-g^{cl}(Z, T1) are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}
b-mi-g^{l}(Z, T1) are Φ, Z
β^{cl} sets are Φ, Z, {ζ_1}, {δ_2}, {Ω_3}, {ζ_1, δ_2}, {ζ_1, Ω_3}
iβ^{cl} sets are Φ, Z, {Ω_3}, {ζ_1, Ω_3}
b-m_i-g^{cl}{ζ_1} is Z
b-m_i-g^{cl}{δ_2} is Z
b-m_i-g^{cl}{Ω_3} is Z
The intersection of b-m_i-g^{cl}{Z} is Z ∀x∈Z.
iβ^{cl}{ζ_1} is {ζ_1, Ω_3}
iβ^{cl}{δ_2} is Z
iβ^{cl}{Ω_3} is {Ω_3}
The intersection of i-β^{cl}{Z} is {Ω_3} not equal to Z ∀x∈Z.

THEOREM 3.49: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-dβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-g^{cl}{x} is empty
∀ x∊Z by fact, every b- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is
dβ^{cl} set Then dβ^{cl}{x} contained in b-m_i-g^{cl}{x} ∀ x∈Z.
That implies the intersection of dβ^{cl}{x} contained in b- m_i-g^{cl}{x}. But the intersection of b-m_i-g^{cl}{x}
empty set ∀x∈Z.
we get the intersection of dβ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-dβ^{R0} space.

EXAMPLE 3.50: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {ζ_1, δ_2} }.
$\leq_{10}$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (Ω_3, ζ_1) }, (δ_2, Ω_3), (δ_2, ζ_1) }.
m_i-g^{cl}(Z, T1) are Φ, Z
b-mi-g^{cl}(Z, T1) are Φ,Z
β^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3} }
dβ^{cl} sets are Φ, Z, {ζ_1, Ω_3}
b-m_i-g^{cl}{ζ_1} is Z
b-m_i-g^{cl}{δ_2} is Z
b-m_i-g^{cl}{Ω_3} is Z
The intersection of b-m_i-g^{cl}{x} is Z ∀x∈Z.
dβ^{cl}{ζ_1} is Z
dβ^{cl}{δ_2} is {δ_2}
dβ^{cl}{Ω_3} are {δ_2, Ω_3}
The intersection of d-β^{cl}{x} is {δ_2} not equal to Z ∀x∈Z.

THEOREM 3.51: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-iβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-g^{cl}{x} is empty
∀ x∊Z by fact, every d- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is
iβ^{cl} set Then iα^{cl}{x} contained in d-m_i-g^{cl}{x} ∀ x∈Z.
That implies the intersection of iβ^{cl}{x} contained in d- m_i-g^{cl}{x}. But the intersection of d-m_i-g^{cl}{x}
empty set ∀x∈Z.
we get the intersection of iβ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-iβ^{R0} space.

EXAMPLE 3.52: Let Z = { ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {Ω_3}, {δ_2, Ω_3} }, $\leq_7$ = {(ζ_1, ζ_1), (δ_2, Ω_3), (Ω_3, Ω_3), (δ_2, ζ_1) } }.
m_i-g^{cl}(Z, T1) are Φ, Z
d-mi-g^{cl}(Z, T1) are Φ,Z
β^{cl}sets are Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}
iβ^{cl} sets are Φ, Z, {ζ_1}, {ζ_1, δ_2}.
d-m_i-g^{cl}{ζ_1} is Z
d-m_i-g^{cl}{δ_2} is Z
d-m_i-g^{cl}{Ω_3} is Z
The intersection of d-m_i-g^{cl}{x} is Z ∀x∈Z.
iβ^{cl}{ζ_1} is {ζ_1}
iβ^{cl}{δ_2} is {ζ_1, δ_2}
iβ^{cl}{Ω_3} is Z
The intersection of iβ^{cl}{x} is {ζ_1} not equal to Z ∀x∈Z.

THEOREM 3.53: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-bβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-g^{cl}{x} is empty ∀ xєZ by fact, every d- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is bβ^{cl} set Then bβ^{cl}{x} contained in d-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of bβ^{cl}{x} contained in d- m_i-g^{cl}{x}. But the intersection of d-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of bβ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-bβ^{R0} space.

EXAMPLE 3.54: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2}, {δ_2, Ω_3} },
$\leq_3$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2), (ζ_1, Ω_3) }.
m_i-g^{cl}(Z, T1) are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}
d-migcl(Z, T1) are Φ,Z, {ζ_1}
β^{cl} sets are Φ, Z, {ζ_1}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
bβ^{cl} sets are Φ, Z
d-m_i-g^{cl}{ζ_1} is {ζ_1}
d-m_i-g^{cl}{δ_2} is Z
d-m_i-g^{cl}{Ω_3} is Z
The intersection of d-m_i-g^{cl}{x} is {ζ_1} ∀x∈Z.
bβ^{cl}{ζ_1} is Z
bβ^{cl}{δ_2} is Z
bβ^{cl}{Ω_3} is Z
The intersection of bβ^{cl}{x} is Z not equal to {ζ_1} ∀x∈Z.

THEOREM 3.55: In a TOS (Z, T, ≤), every W- m_i-g^{cl}(Z, T1) – R_0 space is a W-Ψ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of m_i-g^{cl}{x} is empty set ∀ xєZ by fact, every m_i-g^{cl}(Z, T1)is a m_i^{cl}(Z, T1) and then every m_i^{cl}(Z, T1) is Ψ^{cl} set Then β^{cl}{x} contained in m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of Ψ^{cl}{x} contained in m_i-g^{cl}{x}. But the intersection of m_i-g^{cl}{x} is empty set ∀ x∈Z. we get the intersection of Ψ^{cl}{x} is empty set∀ x∈Z. Hence (Z, T) is W- Ψ^{R0} space.

EXAMPLE 3.56: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {δ_2 }, {Ω_3], {δ_2, Ω_3} }
m_i-g^{cl}(Z, T1) are Φ, Z
Ψ^{cl} sets are Φ, Z, {ζ_1}, {δ_2}, {Ω_3}, {ζ_1, δ_2} {ζ_1, Ω_3}
m_i-g^{cl}{ζ_1} is Z
m_i-g^{cl}{δ_2} is Z
m_i-g^{cl}{Ω_3} is Z
The intersection of m_i-g^{cl}{x} is Z ∀ x∈Z.
Ψ^{cl}{ζ_1} is {ζ_1}
Ψ^{cl}{δ_2} is {δ_2}
Ψ^{cl}{Ω_3} is {Ω_3}
The intersection of Ψ^{cl}{x} ia empty set but not equal to Z ∀ x∈Z.

THEOREM 3.57: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-iΨ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-g^{cl}{x} is empty ∀ xєZ by fact, every i- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is iΨ^{cl} set Then iΨ^{cl}{x} contained in i-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of iΨ^{cl}{x} contained in i- m_i-g^{cl}{x}. But the intersection of i-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of iΨ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-iΨ^{R0} space.

EXAMPLE 3.58: Let Z = { ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3} }.
$\leq_7$ = {(ζ_1, ζ_1), (δ_2, Ω_3), (Ω_3, Ω_3), (δ_2, ζ_1) } }.
m_i-g^{cl}(Z, T1) are Φ, Z
i-mi-g^{cl}(Z, T1) are Φ, Z
Ψ^{cl} sets are Φ, Z, {ζ_1}, {δ_2}, {Ω_3}, {ζ_1, δ_2}, {ζ_1, Ω_3}.
iΨ^{cl} sets are Φ, Z, {ζ_1}, {Ω_3}, {ζ_1, δ_2}, {ζ_1, Ω_3}
i-m_i-g^{cl}{ζ_1} is Z
i-m_i-g^{cl}{δ_2} is Z
i-m_i-g^{cl}{Ω_3} is Z
The intersection of i-m_i-g^{cl}{x} is Z ∀x∈Z.
iΨ^{cl}{ζ_1} is {ζ_1}
iΨ^{cl}{δ_2} is {ζ_1, δ_2}
iΨ^{cl}{Ω_3} is {Ω_3}
The intersection of i-Ψ^{cl}{x} is empty but not equal to Z ∀x∈Z.

THEOREM 3.59: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-dΨ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-g^{cl}{x} is empty ∀ xєZ by fact, every d- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is dΨ^{cl} set Then dΨ^{cl}{x} contained in d-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of dΨ^{cl}{x} contained in d- m_i-g^{cl}{x}. But the intersection of d-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of dΨ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-dΨ^{R0} space.

EXAMPLE 3.60: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {ζ_1, Ω_3} }.
$\leq_6$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (δ_2, ζ_1) }, (ζ_1, Ω_3), {δ_2, Ω_3} }.
m_i-g^{cl}(Z, T1) are Φ, Z
d-mi-g^{cl}(Z, T1) are Φ, Z
Ψ^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}.
dΨ^{cl} sets are Φ, Z, {δ_2}.
d-m_i-g^{cl}{ζ_1} is Z
d-m_i-g^{cl}{δ_2} is Z
d-m_i-g^{cl}{Ω_3} is Z
The intersection of d-m_i-g^{cl}{x} is Z ∀x∈Z.
dΨ^{cl}{ζ_1} is Z
dΨ^{cl}{δ_2} is {δ_2}
dΨ^{cl}{Ω_3} is Z
The intersection of dα^{cl}{x} is {δ_2}not equal to Z ∀x∈Z.

THEOREM 3.61: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-bΨ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-g^{cl}{x} is empty ∀ xϵZ by fact, every b- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is bΨ^{cl} set Then bΨ^{cl}{x} contained in b-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of bΨ^{cl}{x} contained in b- m_i-g^{cl}{x}. But the intersection of b-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of bΨ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-bΨ^{R0} space.

EXAMPLE 3.62: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {ζ_1, Ω_3} }. $\leq_9$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, Ω_3) } }.
m_i-g^{cl}(Z, T1) are Φ, Z
b-mi-g^{cl}(Z, T1) are Φ, Z
Ψ^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}
bΨ^{cl} sets are Φ, Z, {δ_2}.
b-m_i-g^{cl}{ζ_1} is Z
b-m_i-g^{cl}{δ_2} is Z
b-m_i-g^{cl}{Ω_3} is Z
The intersection of b-m_i-g^{cl}{x} is Z ∀x∈Z.
bΨ^{cl}{ζ_1} is Z
bΨ^{cl}{δ_2} is {δ_2}
bΨ^{cl}{Ω_3} is Z
The intersection of b-Ψ^{cl}{x} is {δ_2} is not equal to Z ∀x∈Z.

THEOREM 3.63: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-bΨ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-g^{cl}{x} is empty ∀ xϵZ by fact, every i- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is bΨ^{cl} set Then bΨ^{cl}{x} contained in i-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of bΨ^{cl}{x} contained in i- m_i-g^{cl}{x}. But the intersection of i-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of bΨ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-bΨ^{R0} space.

EXAMPLE 3.64: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2], {ζ_1, δ_2], {ζ_1, Ω_3} }.
$\leq_1$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2), (ζ_1, Ω_3), (δ_2, Ω_3) }.
m_i-g^{cl}(Z, T1) are Φ, Z, {δ_2], {Ω_3], {ζ_1, Ω_3}
i-mi-g^{cl}(Z, T1) are Φ, Z, {Ω_3}
Ψ^{cl} sets are Φ, Z, {δ_2}, {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
bΨ^{cl} sets are Φ, Z
i-m_i-g^{cl}{ζ_1} is Z
i-m_i-g^{cl}{δ_2} is Z
i-m_i-g^{cl}{Ω_3} is {Ω_3}
The intersection of i-m_i-g^{cl}{x} is {Ω_3} ∀x∈Z.
bΨ^{cl}{ζ_1} is Z
Ψcl{δ_2} is Z
bΨ^{cl}{Ω_3} is Z
The intersection of bΨ^{cl}{x} is Z but not equal to {Ω_3} ∀x∈Z.

THEOREM 3.65: In a TOS (Z, T, ≤), every W-i- m_i-g^{cl}(Z, T1) – R_0 space is a W-dΨ^{R0} space but not converse.
Proof. Suppose (Z, T) be a W-i- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of i- m_i-g^{cl}{x} is empty ∀ xϵZ by fact, every i- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is dΨ^{cl} set Then dΨ^{cl}{x} contained in i-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of dΨ^{cl}{x} contained in i- m_i-g^{cl}{x}. But the intersection of i-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of dΨ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-dΨ^{R0} space.

EXAMPLE 3.66: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2}, {ζ_1, δ_2} }.
$\leq_4$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2), (Ω_3, ζ_1), (Ω_3, δ_2) }
m_i-g^{cl}(Z, T1) are Φ, Z
i-mi-g^{cl}(Z, T1) are Φ, Z
Ψ^{cl} sets are Φ, Z, {ζ_1}, {δ_2} {Ω_3}, {δ_2, Ω_3}, {ζ_1, Ω_3}
dΨ^{cl} sets are Φ, Z, {Ω_3}, {ζ_1, Ω_3}
i-m_i-g^{cl}{ζ_1} is Z
i-m_i-g^{cl}{δ_2} is Z
i-m_i-g^{cl}{Ω_3} is Z
The intersection of i-m_i-g^{cl}{x} is Z ∀x∈Z.
dΨ^{cl}{ζ_1} is {ζ_1, Ω_3}
dΨ^{cl}{δ_2} is Z
dΨ^{cl}{Ω_3} is {Ω_3}
The intersection of dΨ^{cl}{x} is{Ω_3] not equal to Z ∀x∈Z.

THEOREM 3.67: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-iΨ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-g^{cl}{x} is empty ∀ xϵZ by fact, every b- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is iΨ^{cl} set Then iΨ^{cl}{x} contained in b-m_i-g^{cl}{x} ∀ x∈Z. That implies the intersection of iΨ^{cl}{x} contained in b- m_i-g^{cl}{x}. But the intersection of b-m_i-g^{cl}{x} empty set ∀x∈Z. we get the intersection of iΨ^{cl}{x} is empty set ∀ x∈Z Hence (Z, T) is W-iΨ^{R0} space.

EXAMPLE 3.68: Let Z={ ζ_1, δ_2, Ω_3 } and T= { Φ, Z, {ζ_1}, {δ_2, Ω_3} }. $\leq_2$ = {(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2) }, (Ω_3, δ_2) }.
m_i-g^{cl}(Z, T1) are Φ, Z, {ζ_1}, {δ_2, Ω_3}
b-mi-g^{cl}(Z, T1) are Φ, Z
Ψ^{cl} sets are Φ, Z, {ζ_1}, {δ_2, Ω_3}
iΨ^{cl} sets are Φ, Z, {δ_2, Ω_3}
b-m_ig-g^{cl}{ζ_1} is Z
b-m_i-g^{cl}{δ_2} is Z
b-m_i-g^{cl}{Ω_3} is Z
The intersection of b-m_i-g^{cl}{x} is Z ∀x∈Z.
iΨ^{cl}{ζ_1} is Z
iΨ^{cl}{δ_2} is {δ_2, Ω_3}
iΨ^{cl}{Ω_3} is {δ_2, Ω_3}
The intersection of iΨ^{cl}{x} is {δ_2, Ω_3} not equal to Z ∀x∈Z.

THEOREM 3.69: In a TOS (Z, T, ≤), every W-b- m_i-g^{cl}(Z, T1) – R_0 space is a W-dΨ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-b- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of b- m_i-g^{cl}\{x\} is empty
∀ x∈Z by fact, every b- m_i-g^{cl}(Z, T1)is a d-m_i^{cl}(Z, T1) and then every d-m_i^{cl}(Z, T1) is
dΨ^{cl} set Then dΨ^{cl}\{x\} contained in b-m_i-g^{cl}\{x\} ∀ x∈Z.
That implies the intersection of dΨ^{cl}\{x\} contained in b- m_i-g^{cl}\{x\}. But the intersection of b-m_i-g^{cl}\{x\}
empty set ∀x∈Z.
we get the intersection of dΨ^{cl}\{x\} is empty set ∀ x∈Z Hence (Z, T) is W-dΨ^{R0} space.

EXAMPLE 3.70: Let Z=\{ ζ_1, δ_2, Ω_3 \} and T= \{ Φ, Z, \{ζ_1\}, \{δ_2\}, \{ζ_1, δ_2\}, \{δ_2, Ω_3\} \}.
$\leq_5$ = \{(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, Ω_3) \}, (δ_2, Ω_3) \}
m_i-g^{cl}(Z, T1) are Φ, Z, \{ζ_1\}, \{Ω_3\}, \{δ_2, Ω_3\}
b-mi-g^{cl}(Z, T1) are Φ,Z
Ψ^{cl} sets are Φ, Z, \{ζ_1\}, \{Ω_3\}, \{δ_2, Ω_3\}, \{ζ_1, Ω_3\}
dΨ^{cl} sets are Φ, Z, \{ζ_1\}
b-m_i-g^{cl}\{ζ_1\} is Z
b-m_i-g^{cl}\{δ_2\} is Z
b-m_i-g^{cl}\{Ω_3\} is Z
The intersection of b-m_i-g^{cl}\{x\} is Z ∀x∈Z.
dΨ^{cl}\{ζ_1\} is \{ζ_1\}
dΨ^{cl}\{δ_2\} is Z
dΨ^{cl}\{Ω_3\} is Z
The intersection of Ψ^{cl}\{x\} is \{ζ_1\} not equal to Z ∀x∈Z.

THEOREM 3.71: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-iΨ^{R0} space but not converse.
Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-g^{cl}\{x\} is empty
∀ x∈Z by fact, every d- m_i-g^{cl}(Z, T1)is a i-m_i^{cl}(Z, T1) and then every i-m_i^{cl}(Z, T1) is
iΨ^{cl} set Then iΨ^{cl}\{x\} contained in d-m_i-g^{cl}\{x\} ∀ x∈Z.
That implies the intersection of iΨ^{cl}\{x\} contained in d- m_i-g^{cl}\{x\}. But the intersection of d-m_i-g^{cl}\{x\}
empty set ∀x∈Z.
we get the intersection of iΨ^{cl}\{x\} is empty set ∀ x∈Z Hence (Z, T) is W-iΨ^{R0} space.

EXAMPLE 3.72: Let Z=\{ ζ_1, δ_2, Ω_3 \} and T= \{ Φ, Z, \{δ_2\}, \{Ω_3\}, \{δ_2, Ω_3\} \}.
$\leq_3$ = \{(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (ζ_1, δ_2), (ζ_1, Ω_3) \}.
m_i-g^{cl}(Z, T1) are Φ, Z
d-mi-g^{cl}(Z, T1) are Φ, Z
Ψ^{cl} are Φ, Z, \{ζ_1\}, \{δ_2\}, \{Ω_3\}, \{ζ_1, δ_2\}, \{ζ_1, Ω_3\}
iΨ^{cl} sets are Φ, Z, \{δ_2\}, \{Ω_3\}
d-m_i-g^{cl}\{ζ_1\} is Z
d-m_i-g^{cl}\{δ_2\} is Z
d-m_i-g^{cl}\{Ω_3\} is Z
The intersections of d-m_i-g^{cl}\{x\} is Z ∀x∈Z.
iΨ^{cl}\{ζ_1\} is Z
iΨ^{cl}\{δ_2\} is \{δ_2\}
iΨ^{cl}\{Ω_3\} is \{Ω_3\}
The intersection of iΨ^{cl}\{x\} is empty not equal to Z ∀x∈Z.

THEOREM 3.73: In a TOS (Z, T, ≤), every W-d- m_i-g^{cl}(Z, T1) – R_0 space is a W-bβ^{R0} space but not converse.

Proof: Suppose (Z, T) be a W-d- m_i-g^{cl}(Z, T1) – R_0 space. Then the intersection of d- m_i-g^{cl}\{x\} is empty
∀ x∈Z by fact, every d- m_i-g^{cl}(Z, T1)is a b-m_i^{cl}(Z, T1) and then every b-m_i^{cl}(Z, T1) is
bΨ^{cl} set Then bΨ^{cl}\{x\} contained in d-m_i-g^{cl}\{x\} ∀ x∈Z.
That implies the intersection of bΨ^{cl}\{x\} contained in d- m_i-g^{cl}\{x\}. But the intersection of d-m_i-g^{cl}\{x\}
empty set ∀x∈Z.
we get the intersection of bΨ^{cl}\{x\} is empty set ∀ x∈Z Hence (Z, T) is W-bΨ^{R0} space.

EXAMPLE 3.74: Let Z=\{ ζ_1, δ_2, Ω_3 \} and T= \{ Φ, Z, \{ζ_1\}, \{ζ_1, Ω_3\} \}. $\leq_7$ = \{(ζ_1, ζ_1), (δ_2, δ_2), (Ω_3, Ω_3), (δ_2, ζ_1) \}.
m_i-g^{cl}(Z, T1) are Φ, Z, \{ζ_1\}, \{δ_2, Ω_3\}
d-mi-g^{cl}(Z, T1) are Φ,Z, \{δ_2, Ω_3]
Ψ^{cl} sets are Φ, Z, \{δ_2\}, \{Ω_3\}, \{δ_2, Ω_3\}
bΨ^{cl} sets are Φ, Z, \{Ω_3\}
d-m_i-g^{cl}\{ζ_1\} is Z bΨ^{cl}\{ζ_1\} is Z
d-m_i-g^{cl}\{δ_2\} is \{δ_2, Ω_3\} bΨ^{cl}\{δ_2\} is Z
d-m_i-g^{cl}\{Ω_3\} is \{δ_2, Ω_3\} bΨ^{cl}\{Ω_3\} is \{Ω_3\}
The intersection of d-m_i-g^{cl}\{x\} is \{δ_2, Ω_3\} The intersection of bΨ^{cl}\{x\} is [Ω_3\} not equal to \{δ_2, Ω_3\}
bΨ^{cl}\{ζ_1\} is Z
bΨ^{cl}\{δ_2\} is Z
bΨ^{cl}\{Ω_3\} is \{Ω_3\}
The intersection of bΨ^{cl}\{x\} is [Ω_3\} not equal to \{δ_2, Ω_3\}

The following diagrams shows the above results.

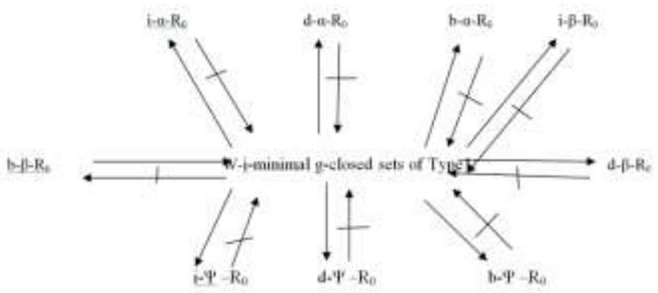

Diagram 1

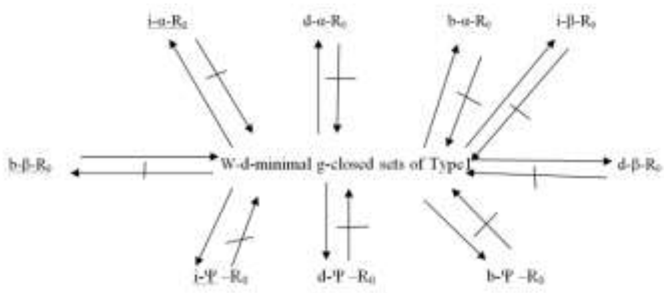

Diagram 2

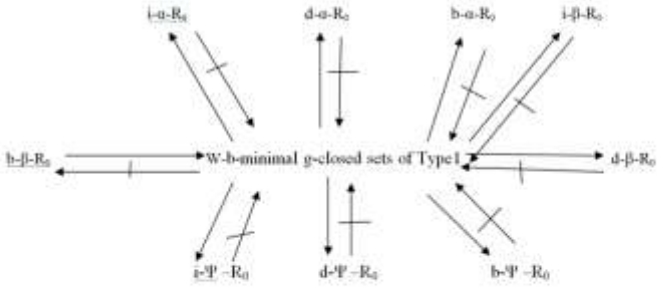

Diagram 3

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