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On Some Intuitionistic Almost Open Maps

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Abstract- In this paper we have introduced intuitionistic almost open maps, intuitionistic almost α-open maps, intuitionistic almost σ-open maps, intuitionistic almost π-open maps and intuitionistic almost β-open maps on intuitionistic topological spaces. These generalized forms of intuitionistic almost open maps are defined by intuitionistic open sets and investigate relationships among these maps. We have constructed some examples which are quite useful in theory of intuitionistic open maps.

Keywords*:* intuitionistic almost open maps, intuitionistic almost α-open maps, intuitionistic almost σ-open maps, intuitionistic almost π-open maps and intuitionistic almost β-open maps

I. INTRODUCTION

The notation of intuitionistic set was introduced by Coker [7] in 1996, and also he [8] has introduced the concept of intuitionistic topological spaces. In 2012, A. Manimaran and K. Arun Prakash [1] introduced the concept of intuitionistic fuzzy almost open mapping. They have also studied some of the properties of intuitionistic fuzzy almost open mapping and their relationship between other existing intuitionistic fuzzy open mappings. In this paper we shall have introduced some generalized form of intuitionistic almost open maps, intuitionistic almost α-open maps, intuitionistic almost σ-open maps, intuitionistic almost π-open maps and intuitionistic almost β-open maps. We obtained some significant properties of such maps and the relationships among these maps on intuitionistic topological spaces.

II. PRELIMINARIES

In this section we have studied set theoretical results of intuitionistic sets. Futher we have studied some generalized forms of intuitionistic open and intuitionistic closed set in intuitionistic topological space.

Definition 2.1 [7] Let X is a non empty set. An intuitionistic set (IS for short) A is an object having the form A = $< X, A_1, A_2 >$, where A_1 and A_2 are subsets of X satisfying $A_1 \cap A_2 = \varphi$. The set A_1 is called the set of members of A, while A_2 is called the set of nonmembers of A.

Definition 2.2 [7] Let X be a non empty set and let A, B are intuitionistic sets in X of the form A = $< X, A_1, A_2 >$, B = $< X, B_1, B_2 >$ respectively. Then
1. $A \subseteq B$ iff $A_1 \subseteq B_1$ and $B_2 \subseteq A_2$;
2. A = B iff $A \subseteq B$ and $B \subseteq A$;
3. $A^c = < X, A_2, A_1 >$;
4. $\varphi\sim = < X, \varphi, X >$, $X\sim = < X, X, \varphi >$;
5. $A \cup B = < X, A_1 \cup B_1, A_2 \cap B_2 >$;
6. $A \cap B = < X, A_1 \cap B_1, A_2 \cup B_2 >$;
Further if $\{A_i : i \in J\}$ is an arbitrary family of intuitionistic sets in X, where $A_i = < X, A_i^{(1)}, A_i^{(2)} >$. Then
7. $\cap A_i = < X, \cap A_i^{(1)}, \cup A_i^{(2)} >$;
8. $\cup A_i = < X, \cup A_i^{(1)}, \cap A_i^{(2)} >$;

Definition 2.3 [8] An intuitionistic topology (for short IT) on a non empty set X is a family of ISs in X satisfying the following axioms.
1. $\varphi\sim, X\sim \in \tau$.
2. $G_1 \cap G_2 \in \tau$ for any $G_1, G_2 \in \tau$.
3. $\cup G_i \in \tau$ for any arbitrary family $\{G_i : i \in J\} \subseteq \tau$. In this case the pair (X,τ) is called an intuitionistic topological space(for short ITS) and any intuitionistic set in τ is known as an intuitionistic open set (for short IOS) in X. The complement A^c of an Intuitionistic open set A is known as an intuitionistic closed set (for short ICS) in X.

Definition 2.4 [7] Let X be a non empty set and p∈X. Then the IS P defined by P = $< X, \{p\},\{p\}^c >$ is called an

intuitionistic point (IP for short) in X. The intuitionistic point P is said to be contained in
$A = < X, A_1, A_2 >$ (i.e $p\in A$) if and only if $p\in A_1$.

Definition 2.5 [8] Let f be a function from a set X to set Y. Let $A=< X, A^1, A^2 >$ be an intuitionistic set in X and $B=< X, B^1, B^2 >$ be an intuitionistic set in Y. Then the preimage $f^{-1}(B)$ is an IS in X defined by
$f^{-1}(B) = < Y, f^{-1}(B^1), f^{-1}(B^2) >$,
and the image f(A) is an IS in Y defined by
$f(A) = < Y, f(A^1), f_-(A^2) >$, where $f_-(A^2) = (f((A^2)^c))^c$.

Definition 2.6 [8] Let A, A_i ($i \epsilon j$) be intuitionistic sets in X, B, B_j ($j \epsilon k$) be intutionistic sets in Y and
f: X → Y a map. Then

1. $A_1 \subseteq A_2 \rightarrow f(A_1) \subseteq f(A_2)$.
2. $B_1 \subseteq B_2 \rightarrow f^{-1}(B_1) \subseteq f^{-1}(B_2)$.
3. $A \subseteq f^{-1}(f(A))$ and if f is 1-1, then $A = f^{-1}(f(A))$.
4. $f^{-1}(\cup B_j) = \cup f^{-1}(B_j)$.
5. $f^{-1}(\cap B_j) = \cap f^{-1}(B_j)$.
6. $f(\cup A_i) = \cup f(A_i)$.
7. $f(\cap A_i) \subseteq \cap f(A_i)$: if f is 1-1, then $f(\cap A_i) = \cap f(A_i)$.
8. $f^{-1}(Y\sim) = X\sim$ and $f^{-1}(\varphi\sim) = \varphi\sim$.
9. $f(X\sim) = Y$ If f is onto $f(\varphi\sim) = \varphi\sim$.
10. If f is onto, then $\overline{f(A)} \subseteq f(\overline{A})$: and if furthermore, f is 1-1, we have $\overline{f(A)} = f(\overline{A})$.
11. $f^{-1}(\overline{B}) = \overline{f^{-1}(B)}$.

Definition 2.7 [9] Let (X, τ) be an ITS. Then intuitionistic set A of X is said to be
(1) Intuitionistic semiopen (for short Iσ-open) if $A \subseteq Icl(Iint(A))$
(2) Intuitionistic preopen (for short Iπ-open) if $A \subseteq Iint(Icl(A))$
(3) Intuitionistic α-open (for short Iα-open)if $A \subseteq Iint(Icl(Iint(A)))$
(4) Intuitionistic β-open (for short Iβ-open) if $A \subseteq Icl(Iint(Icl(A)))$[2]

The compliment of Intuitionistic α-open (resp. Intuitionistic semi-open, Intuitionistic
pre-open, and Intuitionistic β-open) is said to be Intuitionistic α-closed (resp. Intuitionistic semi-closed, Intuitionistic pre-closed, and Intuitionistic
β-closed) $Ii_\alpha(A)$\{resp.$Ii_\sigma(A)$, Ii_π (A) and Ii_β (A)\} is denoted by the union of Intuitionistic α-open (resp. Intuitionistic semi-open, Intuitionistic pre-open,
and Intuitionistic β-open) sets included in A, and
Ic_α (A)\{resp.$Ic_\sigma(A)$, $Ic_\pi(A)$ and $Ic_\beta(A)$\} is denoted by the union of Intuitionistic α-closed (resp. Intuitionistic semi-closed, Intuitionistic pre-closed, and Intuitionistic β-closed) sets including A.
The family of all intuitionistic α-open set (resp. intuitionistic semi-open set, intuitionistic pre-open and intuitionistic β-open set set} subset of a space (X,τ) will be as always denoted by αO(X)(resp. σO(X), πO(X) and βO(X)).

Definition 2.8 [6] Let (X,τ) and (X^I, τ^I) be an ITS's. Then a map f: $X \rightarrow X^I$ is said to be intuitionistic open maps if f (V) is τ^I-IO set in
X^I for every τ–IO set V of X.
Example 3.1 Let X and X^I be ITS's where $X=X^I$ ={a,b,c} and τ = {φ ∼, X ∼, <X, {a, b}, φ >}, τ^I = {φ ∼, X^I∼, < X^I, {c}, φ >} on X and X^I respectively. We consider a map f: $X\rightarrow X^I$ defined by f(a) = c, f(b) = c, f(c) = a. Let V =< X, {a, b}, φ > be τ -intuitionistic-open set in X then f (V) =< X^I, {c}, φ > is τ^I– intuitionistic open set in X^I. Thus f is intuitionistic open maps.

Definition 2.9 [16] A map f: (X, τ) → (X^I, τ^I) is intuitionistic α-open if the image f(A) is intuitionistic α-open in X^I for every intuitionistic open set A in X.

III. SOME GENERALIZED FORM OF INTUITIONISTIC

Almost Open Maps
Definition 3.1 Let (X,τ) and (X^I , τ^I) be an ITS's. Then a map f: X → X^I is said to be **intuitionistic almost open maps** (for short IA-open maps) if
f (V) is τ^I -IO set in X^I for every τ–IRO set V of X.
Example 3.1 Let X and X^I be ITS's where $X=X^I$ = {a,b,c} and τ = {φ ∼, X ∼, <X, {a, b}, φ >, <X, φ, {a, b}>}, τ^I = {φ ∼, X^I∼, < X^I, {c}, φ >, <X^I, φ, {c}>} on X and X^I respectively. We consider a map f: $X\rightarrow X^I$ defined by f(a) = c, f(b) = c, f(c) = a. Let V = < X, {a, b}, φ > be τ -IRO set in X then f (V) = < X^I, {c}, φ > is τ^I – intuitionistic open set in X. Thus f is an intuitionistic almost open maps.

Definition 3.2 Let (X,τ) and (X^I, τ^I) be ITS's. Then the map f : X → X^I is said to be intuitionistic almost α-open map(for short IA-α-open maps) if f (V) is
τ^I -Iα-open set in X^I for every τ−IRO set V of X.

Example 3.2 Let (X,τ) and (X^I, τ^I) be ITS's where X=X^I ={a,b} and τ = {φ ∼, X ∼ , < X, φ, φ >}, τ^I = {φ ∼, X^I∼, < X^I, {a}, φ >, < X^I, φ, {b}, < X, φ, φ>} on X and X^I respectively. We consider a map f: $X\rightarrow X^I$ defined by f(a) = b, f(b) = a. Thus f is intuitionistic almost α-open maps.

Definition 3.3 Let (X,τ) and (X^I, τ^I) be ITS's. Then the map f : X → X^I is said to be intuitionistic almost β-open map(for short IA-β-open maps) if f (V) is τ^I -Iβ-open set in X^I for every τ−IRO set V of X.

Example 3.3 Let (X,τ) and (X^I, τ^I) be ITS's where X=X^I ={a,b} and τ = {φ ∼, X ∼, < X, {a}, {b} >, <X, {b}, {a} >}, τ^I = {φ ∼, X^I∼, < X^I, {a}, φ >, < X^I, φ, {b} >} on X and X^I respectively. We consider a map f: $X\rightarrow X^I$ defined by f(a) = b, f(b) = a. Thus f is an intuitionistic almost β-open map.

Definition 3.4 Let (X,τ) and (X^I, τ^I) be ITS's. Then the map $f : X \rightarrow X^I$ is said to be intuitionistic almost π-open map(for short IA-π-open maps) if f (V) is τ^I -Iπ-open set in X^I for every τ−IRO set V of X.

Example 3.4 Let (X,τ) and (X^I, τ^I) be ITS's where $X=X^I =\{a,b,c\}$ and $\tau = \{\varphi \sim, X \sim, < X, \varphi, \{a\} >, < X, \{a\}, \varphi >\}$, $\tau^I = \{\varphi \sim, X^I\sim, < X, \{c\}, \{a,b\} >, < X, \{a\}, \{b,c\} >, < X, \{a,c\}, \{b\} > \}$ on X and X^I respectively. We consider a map f: $X\rightarrow X^I$ defined by f(a) = b, f(b) = a and f(c)=c. Thus f is an intuitionistic almost π-open map.

Definition 3.5 Let (X,τ) and (X^I, τ^I) be ITS's.
Then the map $f : X \rightarrow X^I$ is said to be intuitionistic almost σ-open map(for short IA-σ-open maps) if
f (V) is τ^I -Iσ-open set in X^I for every τ−IRO set
V of X.

Example 3.5 Let (X,τ) and (X^I, τ^I) be ITSs where $X=X^I =\{a,b\}$ and and $\tau = \{\varphi \sim, X \sim, < X, \varphi, \{a\} >, < X, \{a\}, \varphi >\}$, $\tau^I = \{\varphi \sim, X^I\sim, <X^I, \{a\}, \varphi >, < X, \varphi, \{b\} >\}$ on X and X^I respectively. We consider a map f: $X\rightarrow X^I$ defined by f(a) = b, f(b) = a. Thus f
is an intuitionistic almost σ-open map.

Proposition 3.1 Let (X,τ) and (X^I, τ^I) be ITS's. If $f:X \rightarrow X^I$ is an intuitionistic almost π-open map then f is a intuitionistic almost β-open map.
Proof Let V be τ-IRO set in X. Since f is a intuitionistic almost π-open map, f(V) be Iπ-open set in X^I. Again since each Iπ-open set is Iβ−open set(see [2]), f(V) be a τ^I− Iβ−open set in X^I. Thus f is an intuitionistic almost β-open map.
Remark 3.1 The converse of the above result is not necessarily true.

Example 3.6 Let (X,τ) and (X^I, τ^I) be ITS's where $X=X^I =\{a,b\}$and $\tau = \{\varphi \sim, X \sim, < X, \varphi, \{a\} >,$
$< X, \{a\}, \varphi >, < X, \varphi, \varphi >, < X, \{a\}, \{b\} >, < X, \{b\}, \{a\}>\}$, $\tau^I = \{\varphi \sim, X^I\sim, <X^I, \{a\}, \varphi >, < X^I, \varphi, \{b\} >\}$ on X and X^I respectively. Then $\beta\tau^I = \{\varphi \sim, X^I\sim, <X^I, \{a\}, \varphi >, < X^I, \varphi, \{b\} >, < X^I, \{b\}, \varphi >,$
$< X^I, \varphi, \varphi >, < X^I, \{a\}, \{b\} >, < X^I, \{b\}, \{a\} >\}$ on X^I. We consider a map f: $X\rightarrow X^I$ defined by f(a) =
b, f(b) = a. Let V = $< X, \varphi, \varphi >$ is τ –IRO set in X, but f(V) = $<X^I, \varphi, \varphi >$ is a τ^I− Iβ−open set in X^I not a τ^I− Iπ−open set in X^I. Thus f is an intuitionistic almost β-open map but not an intuitionistic almost π-open map.

Proposition 3.2 1 Let (X,τ) and (X^I, τ^I) be ITS's. If f: $X \rightarrow X^I$ is an intuitionistic almost σ-open map then f is a intuitionistic almost β-open map.
Proof Let V be τ-IRO set in X. Since f is an intuitionistic almost σ-open map, f(V) be Iσ-open set in X^I. Again since each Iσ-open set is Iβ−open set(see [2]), f(V) be a τ^I− Iβ−open set in X^I. Thus f is an intuitionistic almost β-open map.

Remark 3.2 The converse of the above result is not necessarily true.

Example 3.7 Let (X,τ) and (X^I, τ^I) be ITS's where $X=X^I =\{a,b\}$and $\tau = \{\varphi \sim, X \sim, < X, \varphi, \{a\} >, < X, \{a\}, \varphi >, < X, \varphi, \varphi >, < X, \{a\}, \{b\} >, < X, \{b\}, \{a\}>\}$, $\tau^I = \{\varphi \sim, X^I\sim, <X^I, \{a\}, \varphi >, < X^I, \varphi, \{b\} >\}$ on X and X^I respectively. Then $\beta\tau^I = \{\varphi \sim, X^I\sim, <X^I, \{a\}, \varphi >, < X^I, \varphi, \{b\} >, < X^I, \{b\}, \varphi >, < X^I, \varphi, \varphi >, < X^I, \{a\}, \{b\} >, < X^I, \{b\}, \{a\} >\}$ on X^I. We consider a map f: $X\rightarrow X^I$ defined by f(a) = b, f(b) = a. Let V = $< X, \{b\},\{a\} >$ is τ –IRO set in X, but f (V) = $<X^I, \{a\}, \{b\} >$ is a τ^I− Iβ−open set in X^I not a τ^I− Iσ−open set in X^I. Thus f is an intuitionistic almost β-open map but not an intuitionistic almost σ-open map.

Proposition 3.3 Let (X,τ) and (X^I, τ^I) be ITS's. If $f:X \rightarrow X^I$ is an intuitionistic almost α-open map then f is an intuitionistic almost σ-open map.
Proof Let V be τ-IRO set in X. Since f is an intuitionistic almost α-open map, f(V) be Iα-open set in X^I. Again since each Iα-open set is Iσ−open set (see [2]), f(V) be a τ^I− Iσ−open set in X^I. Thus f is an intuitionistic almost σ-open map.

Remark 3.3 The converse of the above result is not necessarily true.

Example 3.8 7 Let (X,τ) and (X^I, τ^I) be ITS's where $X=X^I =\{a,b\}$and $\tau = \{\varphi \sim, X \sim, < X, \varphi, \{a\} >, < X, \{a\}, \varphi >, < X, \varphi, \varphi >\}$, $\tau^I = \{\varphi \sim, X^I\sim, <X^I, \{a\}, \varphi >, < X^I, \varphi, \{b\} >\}$ on X and X^I respectively. Then $\sigma\tau^I = \{\varphi \sim, X^I\sim, <X^I, \{a\}, \varphi >, < X^I, \varphi, \{b\} >, < X^I, \{b\}, \varphi >, < X^I, \varphi, \varphi >\}$ on X^I. We consider a map f: $X\rightarrow X^I$ defined by f(a) = b, f(b) = a. . Let V = $< X, \varphi, \varphi >$ is τ –IRO set in X, but f(V) = $<X^I, \varphi, \varphi >$ is a τ^I− Iσ−open set in X^I not a τ^I− Iα−open set in X^I. Thus f is an intuitionistic almost σ-open map but not an intuitionistic almost α-open map.

Proposition 3.4 Let (X,τ) and (X^I, τ^I) be ITS's. If $f:X \rightarrow X^I$ is an intuitionistic almost α-open map.
then f is an intuitionistic almost π-open map.

Proof Let V be τ-IRO set in X. Since f is an intuitionistic almost α-open map , f(V) be Iα-open set in X^I. Again since each Iα-open set is Iπ−open set (see [2]), f(V) be a τ^I− Iπ−open set in X^I. Thus f is an intuitionistic almost π-open map.

Remark 3.4 The converse of the above result is not necessarily true.

Example 3.7 Let (X,τ) and (X^I, τ^I) be ITS's where $X=X^I =\{a,b,c\}$ and $\tau = \{\varphi \sim, X \sim, < X, \varphi, \{a\} >, < X, \{a\}, \varphi >\}$,

$\tau^{\prime}$ = {φ ~, $X^{\prime}$~, < X, {c}, {a,b} >, < X, {a}, {b,c} >, < X, {a,c}, {b} > } on X and $X^{\prime}$ respectively. We consider a map f: X→ $X^{\prime}$ defined by f(a) = b, f(b) = a and f(c)=c. Let V = < X, {a}, φ > is τ –IRO set in X, but f(V) = <$X^{\prime}$, {b}, φ > is a $\tau^{\prime}$– Iπ–open set in $X^{\prime}$ not a $\tau^{\prime}$– Iα–open set in $X^{\prime}$.Thus f is an intuitionistic almost π-open map but not an intuitionistic almost α-open map.

Proposition 3.5 Let (X,τ) and ($X^{\prime}$, $\tau^{\prime}$) be ITS's. If f: X → $X^{\prime}$ is an intuitionistic almost open map then f is an intuitionistic almost α-open map.

Proof Let V be τ-IRO set in X. Since f is an intuitionistic almost open map, f(V) be I-open set in $X^{\prime}$. Again since each I-open set is Iα–open set(see [2]), f(V) be a $\tau^{\prime}$– Iα–open set in $X^{\prime}$. Thus f is an intuitionistic almost α-open map.

Remark 3.5 The converse of the above result is not necessarily true.

Remark 3.5 From the above discussion and known results we have the following diagram of implications

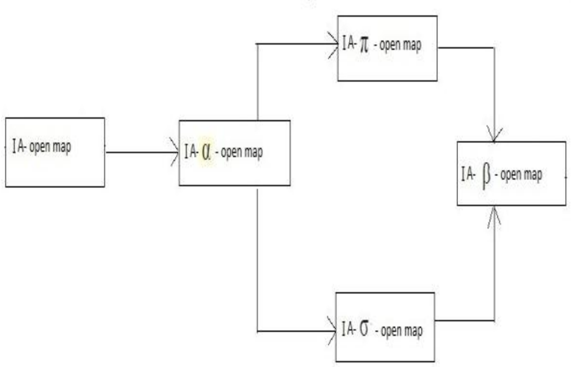

Figure 3.1 Relations between some generalized forms of intuitionistic almost open maps.

In this diagram A ⟶B" we mean A implies B but not conversely and "A ⟷B" means A and B independent of each other

Definition 3.6 A map f: (X, τ) → ($X^{\prime}$, $\tau^{\prime}$) is an intuitionistic σ-open map if the image f(A) is intuitionistic σ-open in $X^{\prime}$, for every intuitionistic open set A in X.

Definition 3.7 A map f: (X, τ) → ($X^{\prime}$,, $\tau^{\prime}$) is an intuitionistic π-open map if the image f(A) is intuitionistic π-open in $X^{\prime}$, for every intuitionistic open set A in X.

Definition 3.8 A map f: (X, τ) → ($X^{\prime}$,, $\tau^{\prime}$) is an intuitionistic β-open map if the image f(A) is intuitionistic β-open in $X^{\prime}$, for every intuitionistic open set A in X.

Definition 3.9 If a map f: (X, τ) → ($X^{\prime}$, $\tau^{\prime}$) is an intuitionistic Almost open and g: ($X^{\prime}$, $\tau^{\prime}$) → ($X^{\prime\prime}$,$\tau^{\prime\prime}$) is intuitionistic α-open map then gof: (X, τ) →($X^{\prime\prime}$, $\tau^{\prime\prime}$) is an intuitionistic Almost α-open map.

Proof Let A be any regular open set in (X, τ).
Since f is an intuitionistic Almost open map, f(A) is intuitionistic open set in ($X^{\prime}$, $\tau^{\prime}$). Since g is intuitionistic α-open map, g(f(A)) is intuitionistic α-open set in ($X^{\prime\prime}$, $\tau^{\prime\prime}$). That is gof(A) = g(f(A) is intuitionistic Almost α-open and hence gof is intuitionistic Almost α-open map.

Definition 3.10 If a map f: (X, τ) → ($X^{\prime}$, $\tau^{\prime}$) is intuitionistic Almost open and g: ($X^{\prime}$, $\tau^{\prime}$) → ($X^{\prime\prime}$,$\tau^{\prime\prime}$) is intuitionistic σ-open map then gof: (X, τ) → ($X^{\prime\prime}$, $\tau^{\prime\prime}$) is an intuitionistic Almost σ-open map.

Proof Let A be any regular open set in (X, τ).
Since f is an intuitionistic Almost open map, f(A) is intuitionistic open set in ($X^{\prime}$, $\tau^{\prime}$). Since g is intuitionistic σ-open map, g(f(A)) is intuitionistic σ-open set in ($X^{\prime\prime}$, $\tau^{\prime\prime}$). That is gof(A) = g(f(A) is intuitionistic Almost σ-open and hence gof is intuitionistic Almost σ-open map.

Definition 3.11 If a map f: (X, τ) → ($X^{\prime}$, $\tau^{\prime}$) is intuitionistic Almost open and g: ($X^{\prime}$, $\tau^{\prime}$) → ($X^{\prime\prime}$, $\tau^{\prime\prime}$) is intuitionistic π-open map then gof: (X, τ) → ($X^{\prime\prime}$, $\tau^{\prime\prime}$) is an intuitionistic Almost π-open map.

Proof Let A be any regular open set in (X, τ).
Since f is an intuitionistic Almost open map, f(A) is intuitionistic open set in ($X^{\prime}$, $\tau^{\prime}$). Since g is intuitionistic π-open map, g(f(A)) is intuitionistic π-open set in ($X^{\prime\prime}$, $\tau^{\prime\prime}$). That is gof(A) = g(f(A) is intuitionistic Almost π-open and hence gof is intuitionistic Almost π-open map.

Definition 3.12 If a map f: (X, τ) → ($X^{\prime}$, $\tau^{\prime}$) is intuitionistic Almost open and g: ($X^{\prime}$, $\tau^{\prime}$) → ($X^{\prime\prime}$, $\tau^{\prime\prime}$) is intuitionistic β-open map then gof: (X, τ) → ($X^{\prime\prime}$, $\tau^{\prime\prime}$) is an intuitionistic Almost β-open map.

Proof Let A be any regular open set in (X, τ).
Since f is an intuitionistic Almost open map, f(A) is intuitionistic open set in ($X^{\prime}$, $\tau^{\prime}$). Since g is intuitionistic β-open map, g(f(A)) is intuitionistic β-open set in ($X^{\prime\prime}$, $\tau^{\prime\prime}$). That is gof(A) = g(f(A) is intuitionistic Almost β-open and hence gof is intuitionistic Almost β-open map.

IV. CONCLUSION

We conclude that the intuitionistic almost open maps, intuitionistic almost α-open maps, intuitionistic almost σ-open maps, intuitionistic almost π-open maps and intuitionistic almost β-open maps have relationship between them.

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