On $Ig^{*}b$-Continuous Functions in Intuitionistic Topological Spaces

[1]P.Sathishmohan, [2]M.Gomathi,[3]M.Amsaveni and [4]V. Rajendran
[1,4]Assistant Professor, [2]Research Scholar, Department of Mathematics,
Kongunadu Arts and Science College (Autonomous),
Coimbatore-641 029.

[3]Assistant Professor, Department of Mathematics,
Nallamuthu Gounder Mahalingam College,
Pollachi-642 001.
Email: iiscsathish@yahoo.co.in**,** gomi.mathi1994@gmail.com,
amsavenim200@gmail.com, rajendrankasc@gmail.com

ABSTRACT

Coker introduced the concept of intuitionistic set and intuitionistic points. He also introduced the concept of intuitionistic topological space and investigated basic properties of continuous function and compactness. The purpose of this paper is to introduce and the study the concept of intuitionistic $g^{*}b$-continuous functions in intuitionistic topological spaces and analyze its relations with other existing intuitionistic continuous functions.

Keywords: $Ig^{*}b$-closed sets and $Ig^{*}b$-continuous functions.

1. Introduction

In 1996 Coker [1] defined and studied intuitionistic topological spaces, intuitionistic open sets, intuitionistic closed sets and compactness on intuitionistic topological spaces. Also, he defined the closure and interior operators in intuitionistic topological spaces and established their properties. Many different forms of continuous functions have been introduced over the years in General Topology. In particular Ekici [2] introduced and studied various forms of continuous functions in topological spaces. Intuitionistic b-open sets and its properties are discussed by Prabhu [5] et.al, Recently Uma Maheswari [8] introduced some new class of functions in intuitionistic topological spaces, called as intuitionistic b-continuous, intuitionistic b-irresolute and intuitionistic b-homeomorphisms and discussed their relations with some of existing functions in intuitionistic topological spaces. This motivates the author to introduced a notion of g^*b-closed sets in intuitionistic topological spaces and studied its basic properties. The aim of this paper is to introduce and study the concept of g^*b-continuous functions in intuitionistic topological spaces and also study its relations with some of existing intuitionistic continuous functions.

2. *PRELIMINARIES*

Definition 2.1. [1] *Let X be 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, 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 non members of A.*

Definition 2.2. [1] *Let X be a non empty set and let A, B are intuitionistic sets in the form*

$A = < X, A_{1,} A_2 >$, $B = < X, B_{1,} B_2 >$*respectively. Then*

(a) $A \subseteq B$ *iff* $A_1 \subseteq B_1$ *and* $A_2 \supseteq B_2$

(b) $A = B$ *iff* $A \subseteq B$ *and* $B \subseteq A$

(c) $\bar{A} = < X, A_{2,} A_1 >$

(d) [ ] $A = < X, A_{1,} (A_1)^C >$

(e) $A - B = A \cap \bar{B}$

(f) $\varphi = < X, \varphi, X >$, $X = < X, X, \varphi >$

(g) $A \cup B =< X, A_1 \cup B_1 >, < X, A_2 \cap B_2 >$

(h) $A \cap B = < X, A_1 \cap B_1 >, < X, A_2 \cup B_2 >$

Definition 2.3. [1] *An intuitionistic topology is (for short IT) on a non empty set X is a family τ of IS's in X satisfying the following axioms.*

(1) φ , $X \in \tau$

(2) $G_1 \cap G_2 \in \tau$, *for any* $G_1, G_2 \in \tau$

(3) $\cup G_\alpha \in \tau$ *for any arbitrary family* $\{G_i : G_\alpha / \alpha \in J\} \subseteq \tau$ *where* (X,τ) *is called an intuitionistic topological space (for short ITS(X)) and any intuitionistic set is called an intuitionistic open set (for short IOS) in X. The complement* A^C *of an IOS A is called an intuitionistic closed set (for short ICS) in X.*

Definition 2.4. [1] *Let* (X,τ) *be an intuitionistic topological space (for short ITS(X)) and*

$A = < X, A_2, A_1 >$ *be an IS in X. Then the interior and closure of A are defined by*

(1) $Icl(A) = \cap \{K : K \text{ is an ICS in } X \text{ and } A \subseteq K\}$

(2) $Iint(A) = \cup \{G : G \text{ is an IOS in } X \text{ and } G \subseteq A\}$.

It can be shown that $Icl(A)$ *is an ICS and* $Iint(A)$ *is an IOS in X and A is an ICS in X iff*

$Icl(A) = A$ *and is an IOS in X iff* $Iint(A) = A$.

Definition 2.5. [1] *Let X be a non empty set and* $p \in X$. *Then the IS P defined by P =* $\langle X, p, p^C \rangle$ *is called an intuitionistic point (IP for short) in X. The intuitionistic point P is said to be contained in* $A = < X, A_2, A_1 >$ *(i.e.,* $P \in A$*) if and only if* $p \in A_1$.

Definition 2.6. [1] *Let* (X,τ) *be an ITS(X). An intuitionistic set A of X is said to be*

(1) *Intuitionistic semi-open if* $A \subseteq Icl(Iint(A))$.

(2) *Intuitionistic pre-open if* $A \subseteq Iint(Icl(A))$.

(3) *Intuitionistic regular-open if* $A = Iint(Icl(A))$.

(4) *Intuitionistic* α*-open if* $A \subseteq Iint(Icl(Iint(A)))$.

(5) *Intuitionistic* β*-open if* $A \subseteq Icl(Iint(Icl(A)))$.

(6) *Intuitionistic b-open if* $A \subseteq Iint(Icl(A)) \cup Icl(Iint(A))$.

The family of all intuitionistic semi-open, intuitionistic pre-open, intuitionistic regular-open, intuitionistic α-open, intuitionistic β-open and intuitionistic b-open sets of (X,τ) *are denoted by ISOS, IPOS, IROS, IαOS, IβOS and IbOS respectively.*

Definition 2.1. [3] *Let* (X, τ) *and* (Y, σ) *be two ITS's and let* $f : X \to Y$ *be a function. Then f is said to be intuitionistic continuous iff the pre image of each IS in σ is an IS in τ.*

Definition 2.2. [3] *Let* (X, τ) *and* (Y, σ) *be two ITS's and let* $f : X \to Y$ *be a function. Then f is said to be closed iff the pre image of each IS in τ is an IS in σ.*

Definition 2.3. [3] *Let* (X, τ) *and* (Y, σ) *be two ITS's and let* $f : X \to Y$ *is called intuitionistic semi-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is semi-closed in X.*

Definition 2.4. [3] *Let* (X, τ) *and* (Y, σ) *be two ITS's and let* $f : X \to Y$ *is called intuitionistic regular-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is regular-closed in X.*

Definition 2.5. [3] *Let* (X, τ) *and* (Y, σ) *be two ITS's and let* $f : X \to Y$ *is called intuitionistic pre-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is pre-closed in X.*

Definition 2.6. [3] *Let* (X, τ) *and* (Y, σ) *be two ITS's and let* $f : X \to Y$ *is called intuitionistic α-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is α-closed in X.*

Definition 2.7. [9] *Let* (X, τ) *and* (Y, σ) *be two ITS's and let* $f : X \to Y$ *is called intuitionistic gp-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is intuitionistic gp-closed in X.*

Definition 2.8. [9] *Let (X, τ) and (Y, σ) be two ITS's and let* $f : X \to Y$ *is called intuitionistic gs-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is intuitionistic gs-closed in X.*

Definition 2.9. [9] *Let (X, τ) and (Y, σ) be two ITS's and let* $f : X \to Y$ *is called intuitionistic sg-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is intuitionistic semi g-closed in X.*

Definition 2.10. [5] *Let (X, τ) and (Y, σ) be two ITS's and let* $f : X \to Y$ *is called intuitionistic gpr-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is intuitionistic gpr-closed in X.*

Definition 2.11. [8] *Let (X, τ) and (Y, σ) be two ITS's and let* $f : X \to Y$ *is called intuitionistic gsr-continuous if for every intuitionistic set V of Y,* $f^{-1}(V)$ *is intuitionistic gsr-closed in X.*

Definition 2.12.[6]*A subset A of an intuitionistic topological space (X,τ) is called Intuitionistic generalized star b-closed set (briefly, Ig*b-closed set) if Ibcl(A)* $\subseteq$ *U whenever A* $\subseteq$ *U and U is Ig-open.*

3. **I*g**_b_-Continuous Functions**

In this section, we define and study the notions of *Ig*b*-continuous functions and discuss some of its properties.

Definition 3.1. *A function* $f : (X,\tau) \to (Y,\sigma)$ *is called intuitionistic generalized star b-continuous (briefly Ig*b-continuous) if the pre image of every intuitionistic closed set* *of Y is Ig*b-closed in X. (i.e)., $f^{-1}(V)$ is Ig*b-closed in (X,τ) for every intuitionistic closed set V of (Y,σ).*

Theorem 3.2. *A function f : (X,τ) →(Y,σ) is Ig*b-continuous iff the preimage of every intuitionistic closed set of Y is Ig*b-closed in X.*

Proof*: Let B = < Y ,B_1, B_2 > be an intuitionistic closed set of Y. Then $f^{-1}(B^c) = f^{-1}$(<Y, B_2, B_1 >) = < X, $f^{-1}(B_2)$, $f^{-1}(B_1)$ >. Also $f^{-1}(B^c) = f^{-1}$(< Y, B_1 ,B_2 >$)^c$ = (< X, $f^{-1}(B_1)$, $f^{-1}(B_2)$ >$)^c$ = < X , $f^{-1}(B_2)$, $f^{-1}(B_1)$ >. Since $f^{-1}(B^c) = (f^{-1}(B))^c$, f or every intuitionistic set B of Y, $f^{-1}(B^c)$ is I-closed in Y. So, $f^{-1}(B)$ is Ig*b-closed in X. Hence f is Ig*b-continuous.*

Theorem 3.3. *Let f : (X,τ) →(Y,σ) be an intuitionistic continuous function. Then f is Ig*b-continuous but not conversely.*

Proof*: Let f : (X,τ) →(Y,σ) be an intuitionistic continuous function and A be any intuitionistic closed set in Y. Then the inverse image $f^{-1}(A)$ is intuitionistic closed in X. Since every intuitionistic closed is Ig*b-closed, $f^{-1}(A)$ is Ig*b-closed in X. So f is Ig*b-continuous.*

Example 3.4. *Let X = {a, b, c} with intuitionistic topology τ^c = {φ,X,A_1,A_2,A_3,A_4,A_5,A_6}*

*, where A_1 = <X,{b},{a}>, A_2 = <X,{a},{b}>, A_3 = <X,{φ},{a}>, A_4 = <X,{φ},{a,b}>, A_5 = <X,{a,b},{φ}>, A_6 = <X,{a},{φ}>and let Y = {1, 2, 3} with intuitionistic topology σ^c = {φ,Y,A_1,A_2,A_3,A_4,A_5,A_6}, where A_1 = <Y,{2},{1}>, A_2 = <Y,{1},{2}>, A_3 = <Y,{2},{φ}>, A_4 = <Y,{φ},{1,2}>, A_5 = <Y,{φ},{2}>, A_6 = <Y,{1,2},{φ}>. Define f : (X,τ) →(Y,σ) by f(a) = 3, f (b) = 1 and f(c) = 2. Then f is Ig*b-continuous but not intuitionistic continuous.*

Theorem 3.5. *Let f : (X,τ) →(Y,σ) be an Ig*b-continuous function. Then f is Igp (resp. Igpr) -continuous but not conversely.*

Proof*: Let B be an intuitionistic closed in (Y,σ). Since f is Ig*b-continuous function,*

$f^{-1}(B)$ *is Ig*b-closed in (X,τ). Since every Ig*b-closed is Igp (resp. Igpr)-closed,* $f^{-1}(B)$ *is Igp (resp. Igpr)-closed. Hence f is Igp (resp. Igpr)-continuous.*

Example 3.6. *Let* $X = \{a, b, c\}$ *with intuitionistic topology* $\tau^c = \{\varphi, X, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* $A_1 = <X,\{b\},\{a\}>$, $A_2 = <X,\{a\},\{b\}>$, $A_3 = <X,\{a\},\varphi>$, $A_4 = <X,\{\varphi\},\{a,b\}>$, $A_5 = <X,\{\varphi\},\{a\}>$, $A_6 = <X,\{a,b\},\{\varphi\}>$ *and let* $Y = \{1, 2, 3\}$ *with intuitionistic topology* $\sigma^c = \{\varphi, Y, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* $A_1 = <Y,\{2\},\{1\}>$, $A_2 = <Y,\{1\},\{2\}>$, $A_3 = <Y,\{\varphi\},\{1\}>$, $A_4 = <Y,\{\varphi\},\{1,2\}>$, $A_5 = <Y,\{1,2\},\{\varphi\}>$, $A_6 = <Y,\{1\},\{\varphi\}>$. *Define* $f : (X,\tau) \to (Y,\sigma)$ *by* $f(a) = 2$, $f(b) = 1$ *and* $f(c) = 3$. *Then f is Igp-continuous but not Ig*b-continuous.*

Example 3.7. *Let* $X = \{a ,b , c\}$ *with intuitionistic topology* $\tau^c = \{\varphi, X, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* $A_1 = <X,\{b\},\{a\}>$, $A_2 = <X,\{a\},\{b\}>$, $A_3 = <X,\{b\},\{\varphi\}>$, $A_4 = <X,\{\varphi\},\{a,b\}\text{i}$, $A_5 = \text{h}X,\{\varphi\},\{b\}\text{i}$, $A_6 = <X,\{a,b\},\{\varphi\}>$ *and let* $Y = \{1,2,3\}$ *with intuitionistic topology* $\sigma^c = \{\varphi, Y, A_1, A_2, A_3, A_4, A_5, A_6, A_7\}$, *where* $A_1 = <Y,\{2\},\{1\}>$, $A_2 = <Y,\{1\},\{2\}>$, $A_3 = <Y,\{\varphi\},\{2\}>$, $A_4 = <Y,\{\varphi\},\{1,2\}>$, $A_5 = <Y,\{\varphi\},\{1\}>$, $A_6 = <Y,\{1,2\},\{\varphi\}>$, $A_7 = <Y,\{2\},\{\varphi\}>$. *Define* $f : (X,\tau) \to (Y,\sigma)$ *by* $f(a) = 2$, $f(b) = 3$ *and* $f(c) = 1$. *Then f is Igpr-continuous butnot Ig*b-continuous.*

Theorem 3.8. *Let* $f : (X,\tau) \to (Y,\sigma)$ *be an Ig*b-continuous function. Then f is Igsr-continuous*

Proof: *Let B be an intuitionistic closed in (Y,σ). Since f is Ig*b-continuous function,* $f^{-1}(B)$ *is Ig*b-closed in (X,τ). Since every Ig*b-closed is Igsr-closed,* $f^{-1}(B)$ *is Igsr-closed. Hence f is Igsr-continuous.*

Example 3.9. *Let* $X = \{a, b, c\}$ *with intuitionistic topology* $\tau^c = \{\varphi, X, A_1, A_2, A_3, A_4, A_5, A_6, A_7\}$, *where* $A_1 = <X,\{b\},\{a\}>$, $A_2 = <X,\{a\},\{b\}>$, $A_3 = <X,\{\varphi\},\{b\}>$, $A_4 = <X,\{\varphi\},\{a,b\}>$, $A_5 = <X,\{\varphi\},\{a\}>$, $A_6 = <X,\{a,b\},\{\varphi\}>$, $A_7 = <X,\{b\},\{\varphi\}>$ *and let* $Y = \{1, 2, 3\}$ *with intuitionistic topology* $\sigma^c =$

$\{\varphi, Y, A_1, A_2, A_3, A_4, A_5, A_6, A_7\}$, *where* A_1 = <Y,{2},{1}>, A_2 = <Y,{1},{2}>, A_3 = <Y,{3},{1,2}>, A_4 = <Y,{φ},{1,2}>, A_5 = <Y,{1,2},{φ}>, A_6 = <Y,{3},{1},{2}>,A_7 = <Y,{2,3},{1}>. *Define* $f : (X,\tau) \rightarrow (Y,\sigma)$ *by* $f(a) = 2$, $f(b) = 3$ *and* $f(c) = 1$. *Then f is Igsr-continuous but not Ig*b-continuous.*

Theorem 3.10. *Let* $f : (X,\tau) \rightarrow (Y,\sigma)$ *be an Iw (resp.Ig*)-continuous function. Then f is Ig*b-continuous but not conversely.*

Proof: *Let B be an intuitionistic closed in* (Y,σ). *Since f is Iw (resp.Ig*)-continuous function,* $f^{-1}(B)$ *is Iw (resp.Ig*)-closed in* (X,τ). *Since every Iw(resp.Ig*)-closed is Ig*b-closed,* $f^{-1}(B)$ *is Ig*b-closed. Hence f is Ig*b-continuous.*

Example 3.11. *Let* $X = \{a, b, c\}$ *with intuitionistic topology* τ^c = $\{\varphi, X, A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9\}$, *where* A_1 = <X,{b},{a}>, A_2 = <X,{a},{b}>, A_3 = <X,{φ},{φ}>, A_4 = <X,{φ},{a,b}>, A_5 = <X,{φ},{b}>, A_6 = <X,{φ},{a}>, A_7 = <X,{a,b},{φ}>, A_8 = <X,{a},{φ}>, A_9 = <X,{b},{φ}>*and let* $Y = \{1, 2, 3\}$ *with intuitionistic topology* σ^c = $\{\varphi, Y, A_1, A_2, A_3, A_4, A_5\}$, *where* A_1 = <Y,{2},{1}>, A_2 = <Y,{,{2}>, A_3 = <Y,{1},{2,3}>, A_4 = <Y,{φ},{1,2}>, A_5 = <Y,{1,2},{φ}>. *Define* $f : (X,\tau) \rightarrow (Y,\sigma)$ *by* $f(a) = 1$, $f(b) = 3$ *and* $f(c) = 2$. *Then f is Ig*b-continuous but not Iw-continuous.*

Example 3.12. *Let* $X = \{a ,b ,c\}$ *with intuitionistic topology* τ^c = $\{\varphi, X, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* A_1 = <X,{b},{a}>, A_2 = <X,{a},{b}>, A_3 = <X,{φ},{b,c}>, A_4 = <X,{φ},{a,b}>, A_5 = <X,{a,b},{φ}>, A_6 = <X,{b},{φ}>*and let* $Y = \{1, 2, 3\}$ *with intuitionistic topology* σ^c =$\{\varphi, Y, A_1, A_2, A_3, A_4, A_5\}$, *where* A_1 = <Y,{2},{1}>, A_2 = <Y,{1},{2}>, A_3 = <Y,{1},{2,3}>, A_4 = <Y,{φ},{1,2}>, A_5 = <Y,{1,2},{φ}>. *Define* $f : (X,\tau) \rightarrow (Y,\sigma)$ *by* $f(a) = 2$, $f(b) = 3$ *and* $f(c) = 1$. *Then f is Ig*b-continuous but not Ig*-continuous.*

Theorem 3.13. *Let* $f : (X,\tau) \rightarrow (Y,\sigma)$ *be an Intuitionistic semi-continuous function. Then f is Ig*b-continuous but not conversely.*

Proof:*Following from Theorem 3.10*

Example 3.16. *Let* $X = \{a, b, c\}$ *with intuitionistic topology* $\tau^c = \{\varphi, X, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* $A_1 = <X,\{b\},\{a\}>$, $A_2 = <X,\{a\},\{b\}>$, $A_3 = <X,\{\varphi\},\{c,a\}>$, $A_4 = <X,\{\varphi\},\{a,b\}>$, $A_5 = <X,\{a,b\},\{\varphi\}>$, $A_6 = <X,\{a\},\{\varphi\}>$*and let* $Y = \{1, 2, 3\}$ *with intuitionistic topology* $\sigma^c = \{\varphi, Y, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* $A_1 = <Y,\{2\},\{1\}>$, $A_2 = <Y,\{1\},\{2\}>$, $A_3 = <Y,\{2,3\},\{\varphi\}>$, $A_4 = <Y,\{\varphi\},1,2\}>$, $A_5 = <Y,\{\varphi\},\{2\}>$, $A_6 = <Y,\{1,2\},\{\varphi\}>$. *Define* $f : (X,\tau) \rightarrow (Y,\sigma)$ *by* $f(a) = 2$, $f(b) = 1$ *and* $f(c) = 3$. *Then f is Ig*b-continuous but not Intuitionistic semi-continuous.*

Theorem 3.17. *Let* $f : (X,\tau) \rightarrow (Y,\sigma)$ *be an Intuitionistic regular-continuous function. Then f is Ig*b-continuous but not conversely.*

Proof: *Similar to Theorem 3.10*

Example 3.18. *Let* $X = \{a, b, c\}$ *with intuitionistic topology* $\tau^c = \{\varphi, X, A_1, A_2, A_3, A_4, A_5\}$, *where* $A_1 = <X,\{b\},\{a\}>$, $A_2 = <X,\{a\},\{b\}>$, $A_3 = <X,\{a\},\{b,c\}>$, $A_4 = <X,\{\varphi\},\{a,b\}>$, $A_5 = <X,\{a,b\},\{\varphi\}>$*and let* $Y = \{1 ,2, 3\}$ *with intuitionistic topology* $\sigma^c = \{\varphi, Y, A_1, A_2, A_3, A_4, A_5\}$, *where* $A_1 = <Y,\{2\},\{1\}>$, $A_2 = <Y,\{1\},\{2\}>$, $A_3 = <Y,\{2\},\{3,1\}>$, $A_4 = <Y,\{\varphi\},\{1,2\}>$, $A_5 = <Y,\{1,2\},\{\varphi\}>$. *Define* $f : (X,\tau) \rightarrow (Y,\sigma)$ *by* $f(a) = 3$, $f(b) = 1$ *and* $f(c) = 2$. *Then f is Ig*b-continuous but not Intuitionistic regular-continuous.*

Theorem 3.19. *Let* $f : (X,\tau) \rightarrow (Y,\sigma)$ *be an Intuitionistic α-continuous functions. Then f is Ig*b-continuous but not conversely.*

Proof: *Similar to Theorem 3.10*

Example 3.20. *Let* $X = \{a, b, c\}$ *with intuitionistic topology* $\tau^c = \{\varphi, X, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* $A_1 = <X,\{b\},\{a\}>$, $A_2 = <X,\{a\},\{b\}>$, $A_3 = <X,\{b,c\},\{\varphi\}>$, $A_4 = <X,\{\varphi\},\{a,b\}>$, $A_5 = <X,\{\varphi\},\{b\}>$, $A_6 = <X,\{a,b\},>$*and let* $Y = \{1, 2, 3\}$ *with intuitionistic topology* $\sigma^c = \{\varphi, Y, A_1, A_2, A_3, A_4, A_5, A_6\}$, *where* $A_1 =$

<Y,{2},{1}>, A_2 = <Y,{1},{2}>, A_3 = <Y,{3,1},{φ}>, A_4 = <Y,{φ},{1,2}>, A_5 = <Y,{φ},{1}>, A_6 = <Y,{1,2},{φ}>. *Define f : (X,τ) →(Y,σ) by f*(a) = 2, *f* (b) = 3 *and f*(c) = 1. *Then f is Ig**b-continuous but not Intuitionistic α-continuous.*

Theorem 3.21. *Let $f : (X,\tau_1) \to (Y,\tau_2)$ be a function. Then the following conditions are equivalent.*

*(i) f is Ig**b-continuous.*

*(ii) The inverse image of intuitionistic closed set in Y is Ig**b-closed in X.*

Proof:

*(i)→(ii) Assume f is Ig**b-continuous. Let A be a intuitionistic closed subset of Y, then Y-A is intuitionistic open in Y and $f^{-1}(Y - A) = X - f^{-1}(A)$ is Ig**b-open in X, which implies that $f^{-1}(A)$ is Ig**b-closed in X.*

*(ii)→(i) Assume, the inverse of each intuitionistic closed set in Y is Ig**b- closed in X. Let B be an intuitionistic open set in Y, then Y-B is a intutitionistic closed set in Y which implies, $f^{-1}(Y - B) = X - f^{-1}(B)$ is Ig**b-closed in X. Hence $f^{-1}(B)$ is Ig**b-open in X, which implies that f is Ig**b-continuous.*

Theorem 3.22. *Let f : (X,τ) →(Y,σ) be Intuitionistic topological spaces. Then the following conditions are equivalent.*

*(i) f is Ig**b-open.*

(ii) f(Ibint(A)) ⊆Ibint(f(A)) for each IS A in X.

(iii) $Ibint(f^{-1}(B)) \subseteq f^{-1}(Ibint(B))$ for each IS B in Y.

Proof:

*(i)→(ii) Let f be an Ig**b-open function. Since f(Ibint(A)) is an Ig**b-open set contained in f(A), f (Ibint(A)) ⊆Ibint(f(A)) by definition of intuitionistic interior. (ii)→(i) Let B*

be any IS in Y. Then $(f^{-1}(B))$ *is an IS in X. By (ii),* $f(Ibint(f^{-1}(B))) \subseteq Ibint(f(f^{-1}(B))) \subseteq (Ibint(B))$.

Thus we have $Ibint(f^{-1}(B)) \subseteq f^{-1}(f(Ibint(f^{-1}(B)))) \subseteq f^{-1}(Ibint(B))$.

*(iii)→(i) Let A be any Ig*b-OS in X. Then* $Ibint(A) = A$ *and f(A) is an IS in Y. By (iii),*

$A = Ibint(A) \subseteq Ibint(f^{-1}(f(A))) \subseteq f^{-1}(Ibint(f(A)))$.

Hence we have $f(A) \subseteq f(f^{-1}(Ibint(f(A)))) \subseteq Ibint(f(A)) \subseteq f(A)$.

Thus $f(A) = Ibint(f(A))$ *and hence f(A) is an Ig*b-OS in Y. Therefore f is an Ig*b-open function.*

Theorem 3.23. *Let* $f : (X,\tau_1) \to (Y,\tau_2)$ *be a single valued function, where X and Y are Intuitionistic topological spaces. Then the following conditions are equivalent.*

(i) *The function f is Ig*b-continuous.*

(ii) *For each point* $p \in X$ *and each intuitionistic open set V in Y with* $f(p) \in V$, *there is aIg*b-open set U in X such that* $p \in U$, $f(U) \subseteq V$.

Proof*:*

(i)→(ii) Assume $f : X \to Y$ *is a single valued function, where X and Y is ITS(X). Let* $f(p) \in V$ *and* $V \subseteq Y$ *and intuitionistic open set, then* $p \in f^{-1}(V) \in$ *Ig*b-open set of X. Since f is Ig*b-continuous, let* $U=f^{-1}(V)$, *then* $p \in U$ *and* $f(U) \subseteq V$.

(ii)→(i) Let V be an intuitionistic open set in Y and $p \in f^{-1}(V)$, *then* $f(p) \in V$, *there exists a* $U_p \in$ *Ig*b-open set of X, such that* $p \in U_p$ *and* $f(U_p) \subseteq V$, *then* $p \in U_p \subseteq f^{-1}(V)$ *and* $f^{-1}(V) = \cup U_p$ *by theorem every intuitionistic continuous function is Ig*b-continuous function. Therefore* $f^{-1}(V)$ *is Ig*b-open set in X. Therefore f is Ig*b-continuous function.*

References

[1] Coker. D, A Note On Intuitionistic Sets and Intuitionistic Points, Turkish Journal of Mathematics, 20(3), 343-351, (1996).

[2] Ekici.E and Caldas. M, Slightly γ-Continuous Functions, Boletim da Sociedade Paranaense de Matematica, 22(3), 63-74, (2004).

[3] Gnanambal Illango and Singaravelan. A, On Intuitionistic β-Continuous Functions, IOSR Journal of Mathematics, 12(6), 08-12, (2016).

[4] Mohana. K and Stephy Stephen, IGSR-Continuity and IGSR Compactness in Intuitionistic Topological Spaces, International Journal of Innovative Research in Technology-4(9), 63-68, (2018).

[5] Prabhu. A, Vadivel. A and Sathyaraj. J, On Intuitionistic Topological Spaces, International Journal of Mathematical Archive, 9(1), 47-53, (2018).

[6] P.Sathishmohan, V. Rajendran and M.Gomathi, On Ig*b- closed sets in intuitionistic topological spaces, Advances and Applications in Mathematical Sciences, 18(11), 2019, 1531-1541.

[7] Selvanayaki. S and Gnanambal Illango, IGPR-Continuity and Compactness in Intuitionistic Topological Spaces, International Journal of Mathematical Archive-5(4), 30-36, (2014).

[8] Uma Maheshwari. O, Vadivel. A and Sathyaraj. J, On Intuitionistic b-Continuity in Intuitionistic Topological Spaces, Journal of Emerging Technologies and Innovative Research-6(1), 97-104, (2019).

[9] Younis J. Yaseen and Asmaa G.Raouf, On Generalization Closed Set and Generalized Continuity On Intuitionistic Topological Spaces, Journal of al-anbar University for Pure Science, 3(1), (2009).