Journal of Yaşar University
http://joy.yasar.edu.tr

COMMUNICATING TASIM ^{O}T-GENETIC QUANTUM KBO MEMORY MODULES CLOSURE

Fevzi ÜNLÜ*

ABSTRACT

A Communicating TASIM ^{o}T-Genetic Quantum KBO Memory Modules Closure is introduced in this paper by using the background information exists in the given references [1-10].

1. INTRODUCTION

Formal languages and Machine Theory are two important notions in the Theory of Computation [1, 2]. The notions of classical logic, sets and recursion are well known [3]. We know that in the last five decades; computer hardware has undergone dramatic cost reduction by the application of the classical logic [4]. This has not been accomplished by corresponding reductions in the software cost of the computing systems. For this reason, a Tidy Automatic Sequential Information-Processing Mechanism, which is briefly called TASIM, was developed [5, 6, and 7]. It is functionally a high-level formal language for designing and realizing logic objects leading to the construction of an instant FLAHOB machine and language pairs [8, and 9]. In this article, an abstract and advanced TASIM ^{o}T-genetic quantum KBO generating formal language ^{o}T will be designed. ^{o}T-genetic quantum KBO codes structured in ^{o}T will be used for developing some optimize able linear ^{o}T-genetic quantum memory module closures. Each member of these closures will be designed for supporting some software memory poor KBOs in [7, 8, 9 and10]. For this purpose, the KBO structures are generated by the ^{o}T are classified into ^{o}c-^{o}T, ^{o}v-^{o}T, ^{o}f-^{o}T, ^{o}g-^{o}T, ^{o}i-^{o}T, ^{o}s-^{o}T, or ^{o}r-^{o}T genetic quantum KBO structures. A TIQ -TOQ genetic quantum or a TOQ-TIQ genetic quantum recursive process on the present and next states are defined on a given sequence of time thresholds. This process is a good for generating a recursively remote programmable ^{o}T-genetic quantum KBO structure for describing new communicating ^{o}i-^{o}T genetic quantum

* Department of Mathematics, Faculty of Science, Yasar University, Bornova, Izmir, Turkey

logic functional instructions with m-variable in mod-n. Each ^{o}i-^{o}T is supported by a pair of **tamra** and **ramta** antenna flipping-flopping system. The tamra is supporting the **rator-head** in the tasimta state or in the tasimra state while the ramta is supporting the **rand-tail** in the tasimra state or in the tasimta states. Hence, the abstract and advanced TASIM ^{o}T-genetic quantum KBO generating formal language ^{o}T has a capacity to generate some compact, deep and recursive ^{o}T-genetic quantum KBO as remote programmable memory structures. It is suggesting that some abstract and advanced CITALOG closures on an ^{o}T-genetic quantum domain ^{o}TD in mod-n, is very easily generate able. Hence, CITALOG has a capacity to define an ^{o}T-genetic quantum Discrete Mathematical formal language in mod-n for designing or describing more powerful FLAHOB computational systems in the horizon of the next generations in the near feature.

Three sections follow this section. In the second section, we introduce preliminary notions of TASIM, KBO, TIQ and TOQ by the definition D-1; the representation of an abstract and advanced TASIM ^{o}T-genetic quantum KBO by the definition D-2; the TIQ or TOQ TASIM ^{o}T-genetic quantum KBO declarations by the definition D-3; and the preliminary semantics and pragmatics by definition D-4. The third section is on the abstract and advanced TASIM ^{o}T-genetic quantum KBOs. It has two subsections. In the subsection 3.1, the grammar rules of the abstract and advanced TASIM ^{o}T-genetic quantum KBOs in a given environment E is studied by the definition D-5. In the section 3.2, some abstract and advanced KBO memory model designs with m control variable in mod-n developments are studied by 3 corollaries and 2 theorems. Six important results are inferred. Four axioms are introduced. The fourth section is on the results and suggestions. The important six results are given and six suggestions are introduced.

In the content of this paper the following notations are used in the given semantic interpretations:

CITALOG : **C**ompact and **I**ntegrated **TA**sim **LOG**ic.

TASIM : **T**idy **A**utomatic **S**equential **I**nformation-processing **M**echanism.

KBO : **K**nowledge **B**ased **O**bject.

TIQ : A TASIM Information Quantifying KBO structure that it is designed in the last state it becomes available in the present state or in the next state.

TOQ : A TASIM Organization Quantifying structure designed in the present state and it becomes available in the present state or in the next state for utilization.

$\geq$	: Symbol of "greater or equal" operator.
<…>	: String terminator in BNF grammar.
^{o}P	: The set of positive numbers, $^{o}P = \{1, 2, \ldots\}$.
$^{o}P[n]$	: The set of positive numbers up to n, $^{o}P[n] = \{1, 2, \ldots, n\}$.
^{o}N	: The set of natural numbers, $^{o}N = \{0, 1, \ldots\}$.
$^{o}N[n]$	: The set of natural numbers up to n, $^{o}N[n] = \{0, 1, 2, \ldots, n\}$.
$^{o}[n]$	: The set of mod-n = $^{o}[n] = \{0, 1, 2, \ldots, n-1\}$.
^{o}T	: ^{o}T-genetic quantum KBO generating formal language.
$^{o}A_T$	: Alphabet of an ^{o}T-genetic quantum KBO generating formal language.
$<x>$	: A vector of x. Where, $\alpha[<x>] = \beta[<x_0, x_1, \ldots, x_{k-1}>] = [x_0, x_1, \ldots, x_{k-1}]$, for $k \in {}^{o}P[n]$, $n \geq 2$, $n \in {}^{o}P$.
$<x^*>$	: A vector of x^*. Where, $\alpha[<x^*>] = \beta[<\epsilon, x, xx, xxx, \ldots x^{k-1}, \ldots>] = [\epsilon, x, xx, xxx, \ldots, x^{k-1}, \ldots]$, for $k \in {}^{o}P[n]$, $n \geq 2$, $n \in {}^{o}P$. Further, $x*x = xx$ is a concatenation operation while "$*$" is the concatenation operator.
(	: The **tamra** antenna. This antenna can be in two different states. They are namely are **tasimta** state and **tasimra** state. It starts to work always in the tasimta state. Hence, the tasimta state is the initial state of tamra. In the tasimta state tamra does always transmit information while it is receiving or intercepting information in the tasimra state.
$^{i}($	: The tamra antenna with a construction-time-ordering i.
$(_k$	: The tamra antenna with a communicational frequency ordering k.
$^{i}(_k$	: The tamra antenna with a construction-time-ordering i and a communicational frequency ordering k.
)	: The ramta antenna. This antenna can also be in two different states. They namely are the tasimra state and the tasimta states. It starts to work always in the tasimra state. Hence, the tasimra state is the initial state of ramta. In the tasimra state ramta does always receives or intercept information while it is transmitting information in the tasimta state.
$^{i})$	: A ramta antenna with a construction-time-ordering i.
$)_k$	: A ramta antenna with a communicational frequency-ordering k.
$^{i})_k$	: A ramta antenna with a construction-time-ordering i and a communicational frequency-ordering k.

$^{i}(_{k}$ x @ y $^{i})_{k}$: A pair of two communicating ^{o}g-^{o}T genetic quantum KBOs under name of x and y.

They are using a flip-flop like antenna system constructed out of tamra " $^{i}(_{k}$ " and ramta " $^{i})_{k}$" . Where, x uses tamra " $^{i}(_{k}$ " and y uses ramta " $^{i})_{k}$" while x and y are communicating together in a given environment E. In this environment, one has to know that tamra has to be in the tasimta state while ramta is in the tasimra state or wise verse when they communicating with each other in a given environment E.

^{o}C : Constant KBO or constant.

^{o}V : Variable KBO or variable.

^{o}T : Abstract and advanced TASIM KBO, or abstract and advanced TASIM KBO generating formal language. Like a forest generating forest, each finite ^{o}T-genetic quantum sub-structure KBO is again an ^{o}T-genetic quantum KBO in ^{o}T.

^{o}c-^{o}T : Constant ^{o}T-genetic quantum KBO.

^{o}v-^{o}T : Variable ^{o}T-genetic quantum KBO.

^{o}f-^{o}T : Functional ^{o}T-genetic quantum KBO.

^{o}g-^{o}T : Gravitationally attracted ^{o}T-genetic quantum KBO.

^{o}i-^{o}T : Instructional ^{o}T-genetic quantum KBO.

^{o}s-^{o}T : Substitutional ^{o}T-genetic quantum KBO.

^{o}r-^{o}T : Reductional ^{o}T-genetic quantum KBO.

^{o}G : A pseudo symbol for representing the body of a given ^{o}f-^{o}T genetic quantum KBO.

λ : A special symbol used as a genetic quantum TASIM particle. It generates an integrated

λx type genetic quantum particle from a given variable x.

^{o}u : A special symbol used as a united genetic quantum TASIM particle for generating a united vector ^{o}ux TASIM particle. Where, $^{o}ux = \lambda x_0 .\lambda x_1 .\lambda x_2 \ldots \lambda x_{n-2} .\lambda x_{n-1}$ in ^{o}T.

^{o}ux : A special united genetic quantum TASIM particle for generating a united ^{o}f-^{o}T.

It is an inspecting and controlling- manager for every free x appearing in the body ^{o}G.

@ : A special gravitational attraction operator symbol. It is used as a genetic quantum particle for generating a TOQ °T-genetic quantum °g-°T from TIQ or TOQ °T-genetic quantum KBOs.

. : A special symbol used as a genetic quantum TASIM particle for separating °ux or λx from its °G as °ux.°G or λx.°G .

↳ : The substitution operator used in an °s-°T.

↲ : The assignment operator used in an °a-°T.

→ : The conditional reduction operator in °T.

↔ or = : The biconditonal reduction operator in an °r-°T.

| : The separating-wall genetic quantum particle. It is not an °T. It is used for separating °T-genetic quantum KBO in same cluster. It is used in the meaning of "or". Read "°Q | °Q⁺" as °Q or °Q⁺"

°CD : Constant Domain.

°VD : Variable Domain.

°TD : TASIM Domain for generating abstract and advanced TASIM.

°D_T : A computed or constructed abstract and advanced TASIM °T-genetic quantum domain.

°D_P : A root genetic quantum particles domain.

Tasimta : TASIM transmitting antenna for information transmitting in TASIM.

Tasimra : TASIM receiving antenna for information receiving in TASIM.

Rand : Operand.

Rator : Operator.

Tamra : The nick name of the antenna system designed for supporting a rator.

Ramta : The nick name of the antenna system designed for supporting a rand.

α : The functional interpretation operator.

α[x] : The interpretation of x, for a given x. Read as "interpretation of x ".

β : The functional coding operator.

β[x] : The coding of x, for a given x. Read as "coding of x".

γ : The functional meaning operator.

γ[x] : The meaning of x, for given x. Read as “meaning of x”.

R[i] = [i] : The i^{th} reference. Read as reference of i.

2. PRELIMINARIES

Let us assume that ⎪, α, β, and γ are the descriptive-or for the information separation, the interpretation, the coding and the meaning operators in the given order in a given environment E. Let us also assume that an α[D-k] is a β[Definition-k] and an α[E-k] is a β[Example-k]. Where, X[Y] is read as “X of Y” for given X and Y.

D-1 (a) **The notion of TASIM:** (i) An α[TASIM] is a β[Tidy Automatic Sequential Information-processing Mechanism]. (ii) An α[^{o}T] is a β[an advanced and abstract TASIM object]. (iii) A γ[^{o}T] is a “ purpose dependent KBO for generating suitable algorithm coded into string objects or text objects as linear structures for solving some certain problems exit in a given environment E.”

(b) **The notion of KBO:** (i) An α[KBO] is a β[Knowledge Based Object]. KBO was first defined formally by [10]. A set of objects come together in order to satisfy a common goal under certain rules of a formal grammar in a given environment E is called a KBO. Each KBO has at least one extendable and contract able memory structure with a distinguishable name. A KBO has a capacity for storing information into its memory for utilizing it in its internal or external communication in a given E. A KBO can also be supported by an antenna system. (ii) An α[IBO] is a β[Information Based Object]. An IBO is a KBO that it is actively or currently under utilization with a known formal code. A KBO may not actively or currently be too fresh as an IBO. However, the existence of a KBO is formally known in a given E. It may also be existed in some other known environments in the universe. It has always a code for describing it in a formal language in those environments properly. The other properties of a KBO can be found in [10].

(c) **The notion of TIQ and TOQ :**(i) An α[TIQ] is a γ[TASIM Information Quantifying structure]. It is usually available in the present state ^{o}Q as an ^{o}T-genetic quantum KBO generating resource. Where, the processing time moves on the previously determined sequence of thresholds of time. In the sequence, the next state always follows the present state, while the present state is following the last state due to this previously determined sequence of thresholds of time. The present state can also be the initial state at the beginning of the process. (ii) An α[TOQ] is a γ[TASIM Organization Quantifying structure]. It is constructed out from some available TIQ or TOQ KBOs in the present state ^{o}Q and it becomes ready in state in order to be utilized in the present state ^{o}Q or in the next state $^{o}Q^{+}$ as a TIQ or TOQ. (iii) A TIQ is a distinguishable structure in the initial state ^{o}Q in a given environment E if the present state ^{o}Q is the initial state in E. A γ[TOQ] is a distinguishable KBO in $^{o}Q \mid {}^{o}Q^{+}$, in the given environment E. In each present state ^{o}Q, if there are some TIQs and TOQs are available for constructing a new TOQ then a new TOQ is constructed out by using those TIQs or TOQs in the present state ^{o}Q, in order to be used in the present state ^{o}Q or in the next state $^{o}Q^{+}$. The objective or the current time threshold is changed by the passage of time, the present state becomes the last state, the next state becomes the present state and a new next state comes into utilization. The constructed TOQs in the last state become generally TIQs in the new present state and they can be used as TIQs in the new constructions for the next state $^{o}Q^{+}$ in E as a new horizon of E. Hence, there exists a TIQ-TOQ process or a TOQ-TIQ process in E. These processes are recursively applied in the paper on the existing ^{o}T- genetic quantum KBOs in a given environment E for obtaining the new ^{o}T-genetic quantum KBOs in E in any time.

E-1 (a) **The notion of TASIM:** (i) TASIM is an abbreviation obtained from "**T**idy **A**utomatic **S**equential **I**nformation-processing **M**echanism." (ii) The ^{o}T is an abbreviation obtained from <TASIM KBO>. Where, an α[< … >] is a γ[code atomizing or vectoring operator]. (iii) The meaning of ^{o}T-genetic quantum KBO is formally an ^{o}T-genetic quantum KBO or an ^{o}T-genetic quantum IBO that it is recursively generated as an algorithm in a string KBO as a formal code in ^{o}T. We will occasionally drop the repetition of the attribute KBOs and IBOs in this paper for the sake of clearness. Hence x KBO │KBO x = x or x IBO │IBO x = x.

(b) **The notion of KBO:** (i) KBO is an abbreviation obtained from "**K**nowledge **B**ased **O**bject". It was first defined formally by [10]. (ii) IBO is an abbreviation obtained from "**I**nformation **B**ased **O**bject." A γ[IBO] is a "new or fresh KBO" utilized first time in this paper.

(c) **The notion of TIQ and TOQ:** (i) A TIQ is an abbreviation for "TASIM Information Quantifying structure" available in a given state that it is ready for utilization in the present state or in the next state. (ii) A TOQ is an abbreviation for "TASIM Organization Quantifying structure" that it is constructed out from TIQs and TOQs in a given present state for utilizing it in the present state ^{o}Q in the next state $^{o}Q^{+}$. **A proper example:** The **letters** of a given alphabet are TIQs in the initial state. They are called shortly the letter-TIQs. The **word-**TOQs are constructed out from the letter-TIQs in the present state-which is the initial state. Time passes a new present state starts. In the new present state, the **sentence-**TOQs are constructed out from the word-TIQs and the letter-TIQs in the active present state. Again the time passes. A new present state starts. In the new present state, the **paragraph-**TOQs are constructed out from the sentence TIQs, the word TIQs and the letter TIQs for utilization in the present state or in the next state. Again the time passes. A new present state starts. In the new present state, the **chapter-**TOQs are constructed out from the paragraph-TIQs, the sentence-TIQs, the word-TIQs and the letter-TIQs for utilization in the present states or in the next state.

D-2 The representation of an abstract and advanced TASIM ^{o}T-genetic quantum KBO: (a) If "O" is an extendable contract able virtual or camouflaged memory, than "O-x" is a KBO with a memory "O" and a name x. We will develop the grammar of an abstract and advanced TASIM ^{o}T-genetic quantum KBO in D-4. We occasionally drop the attribute "O" and KBO in the content. However, a given name x will be understood as an "O-x" KBO. Read "O-x" as "x with an attached memory O".

E-2 **An example for KBO:** If c: ^{o}C implies c : ^{o}T or v : ^{o}V implies v : ^{o}T is declared in ^{o}Q, then "O-c" or "O-v" is a constant KBO or a variable KBO while c or v is as appearing as a constant or a variable in ^{o}Q ⎜ ^{o}Q^{+}.

D-3 TIQ or TOQ in abstract and advanced TASIM ^{o}T-genetic quantum KBO Declarations:

Declaration of a TIQ or a TOQ is generally carried out in the beginning of the initial state. If they are missed to be declared in the beginning of the initial state, then they can be declared in the beginning of a current new present state.

(a) Constant declaration: (i) An α[^{o}C] is a β[constant]. (ii) An α[: ^{o}C] is a β[is constant]. (iii) An α[a, A : ^{o}C] is a β[a or A is a constant]. (vi) An α[a, b, A, B : ^{o}C] is a β[a, b, A or B is a constant]. (v) An α[a ⎜b ⎜A⎜B: ^{o}C] is a β[a, b, A, or B is a constant].

(b) Variable declaration: (i) An α[^{o}V] is a β[variable]. (ii) An α[: ^{o}V] is a β[is variable]. (iii) An α[a, A : ^{o}V] is a β[a or A is a variable]. (vi) An α[a, b, A, B : ^{o}V] is a β[a, b, A or B is a variable]. (v) An α[a ⎜b ⎜A⎜B: ^{o}V] is a β[a, b, A, or B is a variable].

(c) TASIM declaration: (i) An α[^{o}T] is a β[abstract and advanced TASIM]. (ii) An α[: ^{o}T] is a β[is an abstract and advanced TASIM ^{o}T]. (iii) An α[a, A : ^{o}T] is a β[a or A is an abstract and advanced TASIM ^{o}T]. (vi) An α[a, b, A, B : ^{o}T] is a β[a, b, A or B is an abstract and advanced TASIM ^{o}T]. (v) An α[a │b │A│B: ^{o}T] is a β[a, b, A, or B is an abstract and advanced TASIM ^{o}T].

(d) Constant domain declaration: (i) An α[^{o}CD] is a β[Constant TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (ii) An α[: ^{o}CD] is a β[is a Constant TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (iii) An α[A : ^{o}CD] is a β[A is a Constant TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (iv) An α[A, B, C : ^{o}CD] is a β[A, B, or C is a Constant TASIM Domain for generating an ^{o}T-genetic quantum KBO].

(e) Variable domain declaration: (i) An α[^{o}VD] is a β[Variable TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (ii) An α[: ^{o}VD] is a β[is a Variable TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (iii) An α[A : ^{o}VD] is a β[A is a Variable TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (iv) An α[A, B, C: ^{o}VD] is a β[A, B, or C is a Variable TASIM Domain for generating an ^{o}T-genetic quantum KBO].

(f) TASIM domain declaration: (i) An α[^{o}TD] is a β[a TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (ii) An α[: ^{o}TD] is a β[is a TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (iii) An α[A : ^{o}TD] is a β[A is a TASIM Domain for generating an ^{o}T-genetic quantum KBO]. (iv) An α[A, B, C: ^{o}TD] is a β[A, B, or C is a TASIM Domain for generating an ^{o}T-genetic quantum KBO].

D-4 Preliminary Semantics and Pragmatics:

(1) An α[$^{o}D_T$] is a β[computed or constructed abstract and advanced ^{o}TD] in an ^{o}T-genetic quantum environment E.

(2) An α[$^{o}D_P$] is a β[a root genetic quantum particles Domain] in an ^{o}T-genetic quantum environment E.

(3) An α[^{o}r] is a β[reduction or expansion] │a γ[reduction or expansion type],

(4) An α[^{o}s] is a β[substitution]│a γ[substitution type],

(5) An α[^{o}a] is a β[assignment] │a γ[charging] │γ[loading].

(6) An α[^{o}g] is a β[gravitation]│ γ[gravitational type],

(7) An α[^{o}f] is a β[function] │a γ[functional type],

(8) (a) An α[^{o}Q] is a β[the present state].

(b) An α[$^{o}Q^{+}$] is a β[the next state].

(9) An α[λv] │a [λV] is a γ[unary function- manager in an ^{o}T-genetic quantum KBO. It acts like f(^{o}v) │ f(^{o}V) in the classic mathematics],

(10) An α[^{o}i] is a β[instruction] │a γ[instructional],

(11) An α[.] is a γ[binary separation operator on $^{o}D_T$. It is used as a separator in an ^{o}T-genetic quantum KBO constructing process for separating a TIQ or TOQ from another TIQ or TOQ while a new ^{o}T-genetic quantum ^{o}f-^{o}T KBO is constructed in an ^{o}T-genetic quantum language].

(12) An α[@] is a γ["gravitational communication percentage attraction binary collector operator"│ "integration operator"] on $^{o}D_T$ for generating a TOQ ^{o}T-genetic quantum ^{o}g-^{o}T KBO in an ^{o}T-genetic quantum language.

(13) An α[↲] is a γ[a binary "assignment" │ "charging"│ "loading" operator on $^{o}D_T$] for expending or contracting a TIQ or a TOQ ^{o}T-genetic quantum ^{o}a-^{o}T KBO in an ^{o}T-genetic quantum language.

(14) An α[↳] is a γ [binary substitution operator on $^{o}D_T$] for expending or contracting TIQ or TOQ ^{o}T-genetic quantum ^{o}s-^{o}T KBO in an ^{o}T-genetic quantum language.

(15) An α[= │↔] is a γ[a binary "biconditonal derivation" │"biconditonal type simplification"│ "biconditonal type expansion " operator on $^{o}D_T$] for expanding and contracting a TIQ or a TOQ ^{o}T-genetic quantum ^{o}r-^{o}T KBO in an ^{o}T-genetic quantum language.

(16) An α[≀] is a γ[binary "run" │ "evaluation " operator on "^{o}i-^{o}T"] for expanding and contracting a TIQ or a TOQ in an ^{o}T-genetic quantum KBO].

3. THE ABSTRACT AND ADVANCED TASIM ^{O}T-GENETIC QUANTUM KBOs

Let assume that (a) "An α[SYR-k] │an α[SER-k] │an α[PRR-k] " is a "β[Syntax Rule k] │ a β[Semantics Rule k] │a β[Pragmatics Rule k]"; and (b) An α[E] is a β[^{o}T-genetic quantum processing Environment]. The following grammar rules define an ^{o}T-genetic quantum KBO in a given E.

3. 1 The Grammar Rules of the TASIM °T-Genetic quantum KBO generation in a given E.

D-5 Rules of Syntax, semantics and pragmatics: Let us assume that:

(a) An α[°TC] is a β[an abstract and advanced TASIM °T-genetic quantum KBO closure in a given environment E.]

(b) An α[°D_T] is a β[a computed or constructed °TD in an °T-genetic quantum KBO in a given environment E.]

We define the grammar rules of an °T-genetic quantum KBO generating formal language °T for constructing or realizing an °T-genetic quantum KBO by the °T-genetic quantum grammar as following:

(0) SYR-0: "@"│ "."│ "→"│ "↳" │ "↲"│ "(" │ ") "│ "λv" is an °T-genetic quantum root particle symbol for the °T-genetic quantum KBO design in °Q│ °Q^+.

SER-0: "@" │ "."│ "→"│ "↳" │ "↲" │ "("│ ")" │ "λv" is called an °T-genetic quantum root particle for a °T-genetic quantum KBO design in °Q│ °Q^+.

PRR-0: "@" │ ". "│ "→"│ "↳" │ "↲" │ "(" │ ")"│ "λv" is not an °T-genetic quantum KBO design, but each can be used by the °T-genetic quantum grammar for constructing an °T-genetic quantum KBO generating °T-genetic quantum language °T in °Q│ °Q^+.

(1) SYR-1: (i) If "c : °C" │ "v: °V" is an °T-genetic quantum individual KBO declaration in °Q, then "c │ v" is an °T-genetic quantum KBO design in °Q│ °Q^+. (ii) If "C : °C" or "V: °V" is an °T-genetic quantum KBO declaration in °Q, then "C or V" is an °T-genetic quantum KBO in °Q│ °Q^+.

SER-1: (i) c or C is called an °**c-°T** genetic quantum KBO in an °T-genetic quantum KBO generating formal language in °Q│ °Q^+. (ii) v or V is called an °**v-°T** in an °**T-**genetic quantum KBO design in °Q│ °Q^+.

PRR-1: (i) c or C takes at most only one °**T-value** from °D_T in a given °T-genetic quantum KBO design in °Q│ °Q^+. (ii) v or V takes at least two different °**T-value**s from °D_T in an °T-genetic quantum KBO design in °Q│ °Q^+.

(2) SYR-2: (i) If “v: ^{o}V” │“ ^{o}G : ^{o}T” is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then “ λv. ^{o}G ” is an ^{o}T-genetic quantum KBO design in ^{o}Q│ $^{o}Q^{+}$. (ii) If “V: ^{o}V”│ “^{o}G : ^{o}T” is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then “λV. ^{o}G ” is an ^{o}T-genetic quantum KBO design in ^{o}Q│ $^{o}Q^{+}$.

SER-2: “λv.^{o}G” or “λV.^{o}G” is called an ^{o}f-^{o}T genetic quantum KBO in ^{o}Q│ $^{o}Q^{+}$.

PRR-2: (i) “λv” controls each free v in ^{o}G of “λv. ^{o}G” in ^{o}Q│ $^{o}Q^{+}$. (ii) “λV” controls each free vector V in ^{o}G of “^{o}uV. ^{o}G” in ^{o}Q│ $^{o}Q^{+}$.

(3) SYR-3: If “T_1, T_2: ^{o}T” is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then (T_1 @ T_2) is an ^{o}T-genetic quantum KBO design in ^{o}Q│ $^{o}Q^{+}$.

SER-3: If “T_1 , T_2 : ^{o}T” is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then (T_1 @ T_2) is called an “^{o}g-^{o}T” genetic quantum KBO in ^{o}Q│ $^{o}Q^{+}$. Where, T_1 is called a head ^{o}T and T_2 is called a tail ^{o}T in an ^{o}g-^{o}T.

PRR-3: (a) An “^{o}g-^{o}T” genetic quantum KBO is a new TOQ or TIQ generating process design obtained from the TIQ KBO designs or TOQ KBO designs available in an ^{o}T-genetic quantum ^{o}TD KBO design appearing in a given environment E. In this environment:

(i) “**(T_1**” is called a **TIQ-rator** or **TIQ-operator** in an ^{o}g-^{o}T genetic quantum KBO.

(ii) “**@**” is called a **TIQ**-gravitational communication percentage attraction **collector** operator.

(iii) “**T_2)**” is called a **TIQ-rand** or a **TIQ-operand** in an **“^{o}**g-^{o}T” genetic quantum KBO.

(iv) **“(”** is called the head antenna system supporting head **T_1** in the TIQ-rator, which has two states named by tasim**ta** and tasim**ra.** The initial state of **“(”** is the **tasimta** state. Hence, the antenna system has a nick name of **ta**m**ra**.

(v) “**)**” is called the tail antenna system supporting the tail **T_2** in the TIQ-rand, which has also two states named by tasim**ra** and tasi**mta.** The initial state of “**)**” is the **tasimra** state. Hence, the antenna system “**)**” has a nick name of **ra**m**ta**.

(vi) If the head T_1 in the TIQ-rator of an “^{o}g-^{o}T” genetic quantum KBO is an “^{o}f-^{o}T” genetic quantum KBO, then the “ ^{o}g-^{o}T” genetic quantum KBO changes its type and it becomes an “^{o}i-^{o}T” genetic quantum KBO.

In that case, the T_2 appearing in the TIQ-rand of the “^{o}i-^{o}T” genetic quantum KBO is called the tail value of the “^{o}i-^{o}T” genetic quantum KBO.

(4) SYR-4: (i) If "c: ^{o}C"│ "x, v: ^{o}V" │ "^{o}G : ^{o}T" is an ^{o}T-genetic quantum KBO declarations in ^{o}Q, then "(x ↲ <c│v>*@ ^{o}G)" is an ^{o}T-genetic quantum KBO design in ^{o}Q│^{o}Q^{+}. (ii) If "C: ^{o}C"│ "X, V: ^{o}V" │ "^{o}G : ^{o}T" is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then "(X ↲ <C│V>* @ ^{o}G)" is an ^{o}T-genetic quantum KBO design in ^{o}Q│^{o}Q^{+}.

SER-4: (i) If "c : ^{o}C"│ "x, v: ^{o}V " │ "^{o}G : ^{o}T" is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then "(x↲ <c│v>* @ ^{o}G) or "(X↲ <C│V>*@ ^{o}G)" is called an "^{o}a-^{o}T" genetic quantum KBO design in ^{o}Q│ ^{o}Q^{+}. Where "(x↲y @ ^{o}G)" loads the memory of the each free x in ^{o}G by y.

PRR-4: (i) If "c : ^{o}C"│"x, v : ^{o}V" │" ^{o}G : ^{o}T" is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then "(x ↲ <c│v>* @ ^{o}G)" or "(X ↲ <C│V>* @ ^{o}G)" assigns or loads or charges the memory of each free appearance of x or X by <c│v>* or by <C│V>* in ^{o}G in ^{o}Q│ ^{o}Q^{+}.

(5) SYR-5: If "c : ^{o}C"│"x, v : ^{o}V" │" ^{o}G : ^{o}T" is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then "(x↳ <c│v>* @ T)" or "(X↳ <C│V>* @ ^{o}G)" is an ^{o}T-genetic quantum KBO design in ^{o}Q│ ^{o}Q^{+}.

SER-5: If "c: ^{o}C"│"x, v: ^{o}V" │" ^{o}G : ^{o}T" is an ^{o}G-genetic quantum KBO declaration in ^{o}Q, then "(x ↳<c│v>* @T)" or "(X↳<C│V>* @ ^{o}G)" is called an "^{o}s-^{o}T" genetic quantum KBO design in ^{o}Q│ ^{o}Q^{+}.

PRR-5: (a) If "c : ^{o}c"│ "x, v : ^{o}v"│" ^{o}G : ^{o}T" is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then "(x ↳<c│v>* @ ^{o}G)" substitutes each of the free appearance of x by <c│v>* in an ^{o}G-genetic quantum KBO design in ^{o}Q│ ^{o}Q^{+}.

(b) If "c : ^{o}C"│ "x, v : ^{o}V"│" ^{o}G : ^{o}T" is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then "(x ↳<C│V>* @ ^{o}G)" substitutes each of the free appearance of x by <C│V>* in an ^{o}G-genetic quantum KBO design in ^{o}Q│ ^{o}Q^{+}.

E-2 (a) Simple ^{o}T-Genetic quantum KBO designs:

(i) "F, T : ^{o}C" is a ^{o}T-genetic quantum KBO declaration in ^{o}Q, then F or T is a KBO design in

^{o}Q│^{o}Q^{+} by SYR-1.

(ii) "x, y, z : ^{o}V" is an ^{o}T-genetic quantum KBO declaration in ^{o}Q, then

(a) "x, y, or z " is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-1.

(b) "λx.y" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-1and SYR-2.

(c) "(x@z)" is an ºT-genetic quantum KBO by SYR-1 and SYR-3.

(d) "λx.(y@z)" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-1, SYR-
3
and SYR-2.

(e) "(λx.(y@z)@ λx.y)" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-1,
SYR-3, SYR-2, SYR-2, and SYR-3.

(f) "λx.(x@(λx.y@ λz.y))" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ by SYR-1,
SYR-2, SYR-3, and SYR-2.

(iii) (a) "(F↲ λx.λy.x @ F) ↔ F= λx.λy.x" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-3 and SYR-4.

(b) "(T↲ λx.λy.y @ T) ↔ T= λx.λy.y" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-3 and SYR-4.

(iv) (a) "(F ↳ λx.λy.x @ F) ↔ λx.λy.x" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-3 and SYR-5.

(b) "(T ↳ λx.λy.y @ T) ↔ λx.λy.y" is an ºT-genetic quantum KBO design in ºQ ⎜ºQ$^+$ by SYR-3 and SYR-5.

3. 2 Abstract and Advanced Developments

Corollary 1 If "x, y, X, A, B : ºV" and "X ∈ $^{00}D_X$ = {x, y}; X ∈ $^{01}D_X$ = {0 = λx.λy.x , 1 = λx.λy.y}" are ºT-genetic quantum KBO designs in ºQ then

(a) "((X@A) @ B) = A if X = 0"

or

(b) "((X@A) @ B) = B if X = 1

is an ºT-genetic quantum KBO reduction in ºQ ⎜ ºQ$^+$. Where we assume that A or B does not contain any free x | y in its ºT-genetic quantum KBO structure.

Proof : Let assume that "F, T : ºC" | "x, y, z, X, A, B : ºV" and "x, y ∈ $^{00}D_X$ = {F = 0, T = 1}; X ∈ $^{01}D_X$ = {0 = λx.λy.x , 1= λx.λy.y}" are ºT-genetic quantum KBO designs in ºQ, then (X@A) | ((X@A)@B) are ºT-genetic quantum KBO designs in ºQ ⎜ ºQ$^+$ by SYR-1, SYR-3 and SYR-3. Now let us assume that the time passes the current time-interval threshold, a new present state ^{o}Q is started. In this state, we can identify that ((X@A)@B) is an "^{o}g-^{o}T" genetic quantum KBO in ^{o}Q. Checking the content of $^{01}D_X$ shows that there are two "^{o}f-^{o}T"-genetic quantum KBO values can be assigned to X. In both cases ((X@ A)@B) becomes an "i-^{o}T" genetic quantum KBO design. Hence by running ((X@ A)@B) one can obtain the followings:

(a) If X = 0 = λx.λy.x then

((X@A)@B)≀≀= ((0@A)@B)

= ((λx.λy.x @A) @ B)≀

= ((x↳A @ λy.x) @ B)

= (λy.A @ B)≀

= (y↳B @ A)

= A.

(b) If X = 1 = λx.λy.y then

((X@A)@B)≀≀= ((1@A)@B)

= ((λx.λy.y @A) @ B)≀

= ((x↳A @ λy.y) @ B)

= (λy.y @ B)≀

= (y↳B @y)

= B.

See [8] for more details.

Result-1: (a) ((0@A)@B) = A.

(b) ((1@A)@B) = B.

Result-2: ((X@A)@B) is a communicating ^{o}T-genetic quantum KBO memory module design in mod-2. Where, the TIQ X is a control variable in an ^{o}T-genetic quantum KBO memory module design for controlling two genetic quantum memory cells A and B by communicating with them in terms of its ^{o}T-genetic quantum KBO antenna systems. There are two special "^{o}f-^{o}T" genetic quantum KBO tool designs for reading the content of each genetic quantum KBO memory cell module design in this communication.

Result-3: 0 = λx.λy.x reads the content of A and 1 = λx.λy.y reads the content of B in communicating ^{o}T- genetic quantum KBO memory module design of ((X@A)@B) while X ∈ $^{01}D_X$ = {0 = λx.λy.x , 1= λx.λy.y}" in ^{o}Q.

Axiom 1: An ^{o}T-genetic quantum KBO memory module design in an ^{o}T-genetic quantum KBO generating formal language is a KBO.

Axiom 2: Each KBO has at least one extendable-contractible virtual memory design with m-control variables in mod-n.

Axiom 3: Each KBO has at least one active or inactive antenna in its antenna system for supporting its extendable-contractible virtual or camouflage able ^{o}T-genetic quantum KBO memory module design.

Axiom 4: Each observable KBO in a given environment E has an internal or external ^{o}T-genetic quantum KBO memory module design.

Theorem 1 If "(" | "." | ")" | "@" | "λ" | "λx" | "λy" and "x, y, A, B, 0 = λx.λy.x or 1 = λx.λy.y " are ^{o}T-genetic quantum TIQ KBO designs in ^{o}Q, then ^{o1}f = λx.((x @ A)@B) or^{1}f [x]= ((x @ A)@B) is an ^{o}f- ^{o}T-genetic quantum TIQ KBO function design in an "^{o}i- ^{o}T" genetic quantum TOQ KBO for generating all possible logic functions with one control variable like in CITALOG.

Proof (a) Let us assume that "(" | "." | ")" | "@" | "λ" | "λx" | "λy" is an ^{o}T-genetic quantum root particle TIQ KBO design in ^{o}Q and "x, A, B, 0 = λx.λy.x, or 1 = λx.λy.y " an ^{o}T-genetic quantum TIQ KBO design in ^{o}Q then ^{o1}f = λx.((x@A)@B) is a remote TOQ ^{o}f- ^{o}T genetic quantum KBO design in ^{o}T in ^{o}Q | $^{o}Q^{+}$. It generates all possible unary logic functions in CITALOG. For this, let us count all the possible 2-ary combinatorial logic values that one can assign to the AB in mod-2. A 2-ary combinatorial counting in mod-2 gives us the following ^{o}T-genetic quantum combinatorial KBOs:

(i) AB ← 00 | 01 | 10 | 11 is a 2-ary combinatory value in mod-2.

(ii) ^{o}m← ((x@0)@ 0) | ((x@0)@ 1) | ((x@1)@ 0) | ((x@1)@ 1) is an ^{o}i-^{o}T genetic quantum memory module design with one-control variable in mod-2. For each combinatorial value in mod-2 one obtains:

(iii) ^{o1}f = λx.((x@0)@ 0) | λx.((x@0)@ 1) | λx.((x@1)@ 0) | λx.((x@1)@ 1) is an unary ^{o}T-genetic quantum KBO memory module design with one control variable x in mod-2. It is programmed as an ^{o}T-genetic quantum "^{o}f-^{o}T" KBO module closure in CITALOG. Hence,

1) $^{o1}f_{00}$ = λx.((x@0)@ 0) | $^{o1}f_{00}$[x] = ((x@0)@0) is the **unary contrary function**.

Journal of Yaşar University
http://joy.yasar.edu.tr

2) $^{o1}f_{01} = \lambda x.((x@0)@ 1)$ | $^{o1}f_{01}[x] = ((x@0)@1)$ is the **unary identity function**.

3) $^{o1}f_{10} = \lambda x.((x@1)@ 0)$ | $^{o1}f_{10}[x] = ((x@1)@0)$ is the **unary negation function**.

4) $^{o1}f_{11} = \lambda x.((x@1)@ 1)$ | $^{o1}f_{11}[x] = ((x@1)@1)$ is the **unary tautology function**.

This is simply a realization of 4 possible logic functions with one control variable in mod-2. Their proofs are given in the CITALOG. See [5, 6, 7 and 8].

Corollary 2 If "x, y, X, Y, A, B, C, D : ^{o}V" and "X, Y ∈ $^{00}D_X = {}^{00}D_Y = \{x, y\}$; X, Y ∈ $^{01}D_X = {}^{01}D_Y = {}^{01}D_f = \{0 = \lambda x.\lambda y.x , 1= \lambda x.\lambda y.y\}$" are ^{o}T-genetic quantum KBO designs in ^{o}Q then

(a) "((X@((Y@A)@B))@((Y@C)@D))" = A if XY = 00,

(b) "((X@((Y@A)@B))@((Y@C)@D))" = B if XY = 01,

(c) "((X@((Y@A)@B))@((Y@C)@D))" = C if XY = 10,

(d) "((X@((Y@A)@B))@((Y@C)@D))" = D if XY = 11,

is an ^{o}T-genetic quantum KBO reduction design in ^{o}Q │ $^{o}Q^{+}$.

Proof : Let us assume that "x, y, X, Y, A, B, C, D : ^{o}V" and "X, Y ∈ $^{00}D_X = {}^{00}D_Y = \{x, y\}$; X, Y ∈ $^{01}D_X = {}^{01}D_Y = {}^{01}D_f = \{0 = \lambda x.\lambda y.x , 1= \lambda x.\lambda y.y\}$" are ^{o}T-genetic quantum KBO designs in ^{o}Q, then (X@V) | ((X@V)@V) | ((Y@A)@B) | ((Y@C)@D) | ((X@((Y@A)@B))@ ((Y@C)@D)) is an ^{o}i-^{o}T genetic quantum KBO memory module design with two control variables in mod-2 by SYR-1, SYR-3, or SYR-5 in ^{o}Q │ $^{o}Q^{+}$. Now let us assume that the exist generating process is over. A new present state ^{o}Q is started. In this state, we can identify that ((X@((Y@A)@B))@ ((Y@C)@D)) is an "^{o}g-^{o}T" genetic quantum KBO design with 2-control variables in mod-2 in ^{o}Q. Checking the content of $^{o}D_X$ or $^{o}D_Y$, one can see that there are four "^{o}f-^{o}T"- genetic quantum KBO values can be assigned to XY. In all these four cases ((X@((Y@A)@B))@ ((Y@C)@D)) becomes an "i-^{o}T" genetic quantum KBO design with 2-control variables in mod-2. Hence by running ((X@((Y@A)@B))@ ((Y@C)@D)) over these for values one can obtain the followings:

(a) If XY = 00 = $<\lambda x.\lambda y.x><\lambda x.\lambda y.x>$, then

((X@((Y@A)@B))@ ((Y@C)@D))≀≀≀≀=

((0@((0@A)@B))@ ((0@C)@D))≀≀≀≀=

((0@A)@B)≀≀= A.

(b) If XY = 01 = $<\lambda x.\lambda y.x><\lambda x.\lambda y.y>$ then

((X@((Y@A)@B))@ ((Y@C)@D))≀≀≀≀=

((0@((1@A)@B))@ ((1@C)@D))≀≀≀≀=

((1@A)@B)≀≀= B.

(c) If XY = 10 = <λx.λy.y><λx.λy.x> then

((X@((Y@A)@B))@ ((Y@C)@D))≀≀≀≀=

((1@((0@A)@B))@ ((0@C)@D))≀≀≀≀=

((0@C)@D)≀≀= C.

(d) If XY = 11 = <λx.λy.y><λx.λy.y> then

((X@((Y@A)@B))@ ((Y@C)@D))≀≀≀≀=

((1@((1@A)@B))@ ((1@C)@D))≀≀≀≀=

((1@C)@D)≀≀= D.

Result-4: (a) ((0@((0@A)@B))@ ((0@C)@D)) = A,
(b) ((0@((1@A)@B))@ ((1@C)@D)) = B,
(c) ((1@((0@A)@B))@ ((0@C)@D)) = C,
(d) ((1@((1@A)@B))@ ((1@C)@D)) = D.

Result-5: ((X @ ((Y@A)@B))@ ((Y@C)@D)) is a communicating ^{o}T-genetic quantum KBO memory module design with 2-control variables in mod-2. Where, the TIQ X or TIQ Y is an ^{o}T-genetic quantum KBO variable for controlling the four communicating ^{o}T-genetic quantum KBO memory cell A, B, C, or D. There are four “^{o}f-^{o}T” genetic quantum functional KBO tools for reading the content of each ^{o}T-genetic quantum KBO memory cell module design.

Result-6: 00 = <λx.λy.x><λx.λy.x> reads the content of A, 01 = <λx.λy.x> <λx.λy.y> reads the content of B, 10 = <λx.λy.y><λx.λy.x> reads the content of C, and 11 = <λx.λy.y> <λx.λy.y> reads the content of D in a communicating ^{o}T-genetic quantum memory model of ((X@((Y@A)@B))@ ((Y@C)@D)) in mod-2 while X, Y ∈ $^{o}D_X = {}^{o}D_Y$ ={0 = λx.λy.x , 1= λx.λy.y}” is in $^{o}Q \,|\, {}^{o}Q^{+}$.

Journal of Yaşar University
http://joy.yasar.edu.tr

Theorem 2 If "x, y, X, Y, A, B, C, D : ^{o}V" and "X, Y ∈ $^{00}D_X$ = $^{00}D_Y$ ={x, y}; X, Y ∈ $^{01}D_X$ = $^{01}D_Y$ = $^{01}D_f$ = {0 = λx.λy.x , 1= λx.λy.y }" and "(| . |) | @ | λ | λx | λy" are ^{o}T-genetic quantum root particle TIQ KBO design in ^{o}Q, then "λx.λy.((X@ ((Y@A)@ B))@((Y@C)@D))" is a TOQ "^{o}f- ^{o}T" KBO design that it can be programmed for generating all the possible logic functions with two variables in mod-2 like in CITALOG.

Proof (a) Let us assume that "x, y, X, Y, A, B, C, D : ^{o}V" and "X, Y ∈ $^{00}D_X$ = $^{00}D_Y$ ={x, y}; X, Y ∈ $^{01}D_X$ = $^{01}D_Y$ = $^{01}D_f$ = {0 = λx.λy.x , 1= λx.λy.y}" "(| . |) | @ | λ | λx | λy" are ^{o}T-genetic quantum root particle TIQ KBO designs in ^{o}Q, then if we wish to use ^{o1}f← "λx.λy.((X@ ((Y@A)@ B))@((Y@C)@D))" as a remote TOQ ^{o}f- ^{o}T KBO design for generating all the possible logic functions with 2-control variables in mod-2 like in CITALOG, we must count all the possible combinatory values that one can assign to the ABCD in mod-2 . The mod-2 combinatory counting gives us the following ^{o}T-genetic quantum values:

(i) ABCD ← 0000 | 0001 | 0010 | 0011 | 0100 | 0101 | 0110 | 0111 | 1000 | 1001 | 1010 | 1011 | 0100 | 1101 | 1110 | 1111 2-ary combinatory logic values.

(ii) ^{o}m← ((x@ ((y@0)@ 0))@((y@0)@0)) | ((x@ ((y@0)@ 0))@((y@0)@1)) |
((x@ ((y@0)@ 0))@((y@1)@0)) | ((x@ ((y@0)@ 0))@((y@1)@1)) |
((x@ ((y@0)@ 1))@((y@0)@0)) | ((x@ ((y@0)@ 1))@((y@0)@1)) |
((x@ ((y@0)@ 1))@((y@1)@0)) | ((x@ ((y@0)@ 1))@((y@1)@1)) |
((x@ ((y@1)@ 0))@((y@0)@0)) | ((x@ ((y@1)@ 0))@((y@0)@1)) |
((x@ ((y@1)@ 0))@((y@1)@0)) | ((x@ ((y@1)@ 0))@((y@1)@1)) |
((x@ ((y@1)@ 1))@((y@0)@0)) | ((x@ ((y@1)@ 1))@((y@0)@1)) |
((x@ ((y@1)@ 1))@((y@1)@0)) | ((x@ ((y@1)@ 1))@((y@1)@1)) |

is an ^{o}i-^{o}T-genetic quantum memory module closure design with 2-control variables in mod-2 for utilizing it in ^{o}Q | $^{o}Q^{+}$.

(iii) ^{o1}f← λx.λy. ^{o}m = λx.λy.((x@((y@0)@0))@((y@0)@0)) |
λx.λy.((x@((y@0)@0))@((y@0)@1)) | λx.λy.((x@((y@0)@0))@((y@1)@0)) |
λx.λy.((x@((y@0)@0))@((y@1)@1)) | λx.λy.((x@((y@0)@1))@((y@0)@0)) |
λx.λy.((x@((y@0)@1))@((y@0)@1)) | λx.λy.((x@((y@0)@1))@((y@1)@0)) |
λx.λy.((x@((y@0)@1))@((y@1)@1)) | λx.λy.((x@((y@1)@0))@((y@0)@0)) |
λx.λy.((x@((y@0)@0))@((y@0)@1)) | λx.λy.((x@((y@1)@0))@((y@1)@0)) |
λx.λy.((x@((y@1)@0))@((y@1)@1)) | λx.λy.((x@((y@1)@1))@((y@0)@0)) |
λx.λy.((x@((y@1)@1))@((y@0)@1)) | λx.λy.((x@((y@1)@1))@((y@1)@0)) |

λx.λy.((x@((y@1)@1))@((y@1)@1))

is a properly programmed "^{o}f-^{o}T" genetic quantum function module closure design with 2-control variables in mod-2 for CITALOG. This is simply an ^{o}T-genetic quantum logic function realization. It has 16 logic functions in the 16 distinguishable states. One can easily utilize it in the logic design.

(iii) If one wishes to give a proper names to each of these functional module designs he or she can give as in the following:

^{o2}f [x, y]← ^{o}m implies that

$^{o2}f_0$ [x, y] = ((x@((y@0)@0))@((y@0)@0)) |

$^{o2}f_1$ [x, y] = ((x@((y@0)@0))@((y@0)@1)) |

$^{o2}f_2$ [x, y] = ((x@((y@0)@0))@((y@1)@0)) |

$^{o2}f_3$ [x, y] = ((x@((y@0)@0))@((y@1)@1)) |

$^{o2}f_4$ [x, y] = ((x@((y@0)@1))@((y@0)@0)) |

$^{o2}f_5$ [x, y] = ((x@((y@0)@1))@((y@0)@1)) |

$^{o2}f_6$ [x, y] = ((x@((y@0)@1))@((y@1)@0)) |

$^{o2}f_7$ [x, y] = ((x@((y@0)@1))@((y@1)@1)) |

$^{o2}f_8$ [x, y] = ((x@((y@1)@0))@((y@0)@0)) |

$^{o2}f_9$ [x, y] = ((x@((y@1)@0))@((y@0)@1)) |

$^{o2}f_A$ [x, y] = ((x@((y@1)@0))@((y@1)@0)) |

$^{o2}f_B$ [x, y] = ((x@((y@1)@0))@((y@1)@1)) |

$^{o2}f_C$ [x, y] = ((x@((y@1)@1))@((y@0)@0)) |

$^{o2}f_D$ [x, y] = ((x@((y@1)@1))@((y@0)@1)) |

$^{o2}f_E$ [x, y] = ((x@((y@1)@1))@((y@1)@0)) |

$^{o2}f_F$[x, y] = ((x@((y@1)@1))@((y@1)@1)).

Hence, he or she realizes the 16 ^{o}T-genetic quantum logic functions closure design with 2-control variables in mod-2. This closure contains all the logic functions designable with 2-control variables in mod-2 like in the CITALOG. Where:

1) $^{o2}f_0$ acts as the logical contradiction function.

2) $^{o2}f_1$ acts as the logical conjunction or AND function.

3) $^{o2}f_2$ acts as the logical negation of conditional function.

4) $^{o2}f_3$ acts as the logical identity of x function.

5) $^{o2}f_4$ acts as the logical negation of converse function.

6) $^{o2}f_5$ acts as the logical identity of y function.

7) $^{o2}f_6$ acts as the logical exclusive-OR function.

8) $^{o2}f_7$ acts as the logical disjunction or OR function.

9) $^{o2}f_8$ acts as the logical not disjunction or NOR function.

A) $^{o2}f_9$ acts as the logical equivalence function.

B) $^{o2}f_A$ acts as the logical negation of y function.

C) $^{o2}f_B$ acts as the logical converse function.

D) $^{o2}f_C$ acts as the logical negation of x function.

E) $^{o2}f_D$ acts as the logical conditional function.

F) $^{o2}f_E$ acts as the logical not conjunction or NAND function

G) $^{o2}f_F$ acts as the logical tautology function.

D-6 : (1) $^{o[1,*]}M[x_0] =$

$\{^{o[1,1]}M[x_0] = {}^{0}(x_0 @ C)^{0},$

$^{o[1,2]}M[x_0] = {}^{1}({}^{0}(x_0 @ C)^{0} @ C)^{1},$

$^{o[1,3]}M[x_0] = {}^{2}({}^{1}({}^{0}(x_0 @ C)^{0} @ C)^{1} @ C)^{2},$

$\ldots,$

$^{o[1,n]}M[x_0] = {}^{n-1}({}^{n-2}(\ldots{}^{2}({}^{1}({}^{0}(x_0 @ C)^{0} @ C)^{1} @ C)^{2} \ldots @C)^{n-2} @C)^{n-1}$

$\}$

is called an ^{o}T-genetic quantum KBO memory modules closure design with n memory cell(s) controlled by one-control variable, $n \in {}^{o}P$.

(2) $^{o[2,*]}M[x_0, x_1] =$

$\{^{o[2,1]}M[x_0, x_1] = {}^{0}(x_0 @ {}^{o[1,1]}M[x_1])^{0},$

$^{o[2,2]}M[x_0, x_1] = {}^{1}({}^{0}(x_0 @ {}^{o[1,2]}M[x_1])^{0} @ {}^{o[1,2]}M[x_1])^{1},$

$^{[2,3]}M[x_0][x_0, x_1] = {}^{2}({}^{1}({}^{0}(x_0 @ {}^{o[1,3]}M[x_1])^{0} @ {}^{o[1,3]}M[x_1])^{1} @ {}^{o[1,3]}M[x_1])^{2}$

,

$\ldots,$

$^{o[2,n]}M[x_0, x_1] = {}^{n-1}({}^{n-2}(\ldots{}^{2}({}^{1}({}^{0}(x_0 @ {}^{o[1,n]}M[x_0])^{0} @$
$^{o[1,n]}M[x_0])^{1} @$
$^{o[1,n]}M[x_0])^{2} @$
$\ldots @$
$^{o[1,n]}M[x_0])^{n-2} @$
$^{o[1,n]}M[x_0])^{n-1}$

$\}$

is called an ^{o}T-genetic quantum KBO memory modules closure design with n^2 memory cell(s) controlled by 2-control variable, $n \in {}^{o}P$.

(m) $^{[m, *]}M[x_{0,} x_{1,} x_2, \ldots, x_{m-1}] =$

$\{ \, ^{[m, 1]}M[x_{0,} x_{1,} x_2, \ldots, x_{m-1}] = {}^{0}(x_0 @ {}^{[m-1, 1]}M_{m-1}(x_{1,} x_2, \ldots, x_{m-1}))^{0},$

$^{[m, 2]}M[x_{0,} x_{1,} x_2, \ldots, x_{m-1}] = {}^{1}({}^{0}({}_0 \, x_0 @ {}^{[m-1, 2]}M[x_{1,} x_2, \ldots, x_{m-1}])^{0} @$
$^{[m-1, 2]}M[x_{1,} x_2, \ldots, x_{m-1}])^{1},$

$[^{m, 3]}M[x_{0,} x_{1,} x_2, \ldots, x_{m-1}] = {}^{2}({}^{1}({}^{0}(x_0 @ {}^{[m-1, 3]}M[x_{1,} x_2, \ldots, x_{m-2}])^{0}$
$@ {}^{[m-1, 3]}M[x_{1,} x_2, \ldots, x_{m-2}])^{1}$
$@ {}^{[m-1, 3]}M[x_{1,} x_2, \ldots, x_{m-2}])^{2} ,$

…,

$^{[m, n]}M \, [x_{0,} x_{1,} x_2, \ldots, x_{m-1}] = {}^{n-1}({}^{n-2}(\ldots {}^{2}({}^{1}({}^{0}(x_0 @ {}^{[m, n-1]}M[x_{1,} x_2, \ldots, x_{m-1}])^{0}$
$@ {}^{[m, n-1]}M[x_{1,} x_2, \ldots, x_{m-1}])^{1}$
$@ {}^{[m, n-1]}M[x_{1,} x_2, \ldots, x_{m-1}])^{2}$
…
$@ {}^{[m, n-1]}M[x_{1,} x_2, \ldots, x_{m-1}])^{n-2}$
$@ {}^{[m, n-1]}M[x_{1,} x_2, \ldots, x_{m-1}])^{n-1}$

}

is called an ^{o}T-genetic quantum KBO memory modules closure design with n^m memory cell(s) controlled by m-control variable, $n \in {}^{o}P$.

E-2: (1)(a) $^{[1,2]}M_1(x_0) = {}^{1}({}^{0}(x_0 @ C)^{0} @ C)^{1}$
is an ^{o}T-genetic quantum KBO memory module design with one-control variable in mod-2.

(b) $^{[1,2]}M_1(x_1) = {}^{1}({}^{0}(x_1 @ C)^{0} @ C)^{1}$
is also an ^{o}T-genetic quantum KBO memory module design with one-control variable in mod-2.

(2) (a) $^{[2,2]}M_2[x_{0,} x_1] = {}^{1}({}^{0}(x_0 \; @ {}^{[1,2]}M_1[x_1])^{0} @ {}^{[1,2]}M_1[x_1])^{1}$
$= {}^{1}({}_0 \, {}^{0}({}_1 \, x_0 @ {}^{1}({}_2 \, {}^{0}({}_3 \, x_1 @ C \, {}_3)^{0} @ C \, {}_2)^{1} \, {}_1)^{0} @ {}^{1}({}_1 \, {}^{0}({}_2 \; x_1 @ C \, {}_2)^{0} @ C \, {}_1)^{1} \, {}_0)^{1}$
is an ^{o}T-genetic quantum KBO memory module design with 2-control variables in mod-2.

(b) $^{[2,2]}M[x_{1,} x_2] = {}^{1}({}^{0}({}_1 \, x_1 @ {}^{1}({}^{0}(x_2 @ C)^{0} @ C)^{1})^{0} @ {}^{1}({}^{0}(x_2 @ C)^{0} @ C)^{1})^{1}$

is also an ^{o}T-genetic quantum memory module design with 2-control variables in mod-2 for controlling 2^2 cells.

$$(3)\ {}^{[3,2]}M[x_0, x_1, x_2] = {}^{1}(\,{}^{0}(x_0 @ {}^{[2,2]}M_2[x_1, x_2])^0 @ {}^{[2,2]}M_2[x_1, x_2])^1$$

$$= {}^{1}(_0\, {}^{0}(_1\, x_0 @ {}^{1}(_2\, {}^{0}(_3\, x_1 @ {}^{1}(_4\, {}^{0}(_5\, x_2 @ C\, _5)^0 @ C\, _4)^1\, _3)^0 @ {}^{1}(_3\, {}^{0}(_4\, x_2 @ C\, _4)^0 @ C\, _3)^1\, _2)^1\, _1)^0$$
$$@ {}^{1}(_1\, {}^{0}(_2\, x_1 @ {}^{1}(_3\, {}^{0}(_4\, x_2 @ C\, _4)^0 @ C\, _3)^1\, _2)^0 @ {}^{1}(_2\, {}^{0}(_3\, x_2 @ C\, _3)^0 @ C\, _2)^1\, _1)^1\, _0)^1$$

is an ^{o}T-genetic quantum KBO memory module with 3-control variables mod-2 for controlling 2^3 cells.

4. RESULTS AND SUGGESTIONS

In this paper, an abstract TASIM ^{o}T-genetic quantum KBO generating formal language ^{o}T has recursively been designed. A linear ^{o}T-genetic quantum KBO memory module closure design has been developed. It is good for generating optimally any logic function with m-control variables in mod-n in this ^{o}T-genetic quantum KBO memory module closure. See [8]. The found result is suggesting that the CITALOG can describe a deep and compact optimal Discrete Mathematics. Hence:

1) CITALOG has been extended into any m-variables ^{o}T-genetic quantum logic KBO memory module closure design which is sensitive to values in mod-n for $n \geq 2$, $n \in N$.

2) A function on any finite subset of the natural numbers can be realized optimally in the abstract and advanced TASIM ^{o}T-genetic quantum memory modules closure design.

3) The author thinks that every KBO has a memory. A formal directed graph can optimally be generated in the abstract and advanced TASIM ^{o}T-genetic quantum KBO memory modules closure design as a communicating cluster of KBOs.

4) A directed graph is a state machine model like FLA KBO in the FLAHOB KBO. The abstract and advanced TASIM ^{o}T-genetic quantum KBO generating formal language is a language model like HOB in the FLAHOB. This suggests that the abstract and advanced TASIM ^{o}T-genetic quantum KBO memory modules closure design has capacity to describe any finite state machine and its formal languages. CITALOG optimizes them.

5) Two research papers under the name of: (a) "Remote programmable TASIM ^{o}T-genetic quantum KBO cluster on the optimal abstract and advanced TASIM ^{o}T-genetic quantum memory closure" and (b) "Internal and external communication on the remote

programmable TASIM ºT-genetic quantum KBO cluster on the optimal abstract and advanced TASIM ºT-genetic quantum KBO memory modules closure design” under our study. They will be released soon.

6) Corollary 3 shows that CITALOG can be extended into a combinatorial mathematics on ºP.

REFERENCES

[1] Linz, P.: *An Introduction to Formal Languages and Automata,* Fourth Edition, Jones and Bartlett Publishers, London, 2006.

[2] Denning, P., Dennis, J. B.; Joseph, E.Q.: *Machines, Languages, and Computation*, Prentice-Hall, Inc., Englewood Cliffs, N.J07632, 1978.

[3] Causey, R. L.: *Logic, Sets, and Recursion,* Second Edition, Jones and Bartlett Publishers, Inc., London, 2006

[4] Roth, C. H.: *Fundamentals of Logic Design,* Third Edition, West Publishing Company, St. Paul, Minnesota, 55164, 1985.

[5] Ünlü, F.: *Kuramsal λ-Tasımlaması,* Atatürk Üniversitesi Basımevi, Erzurum, 1976.

[6] Ünlü, F.: *A TASIM Logic realization of Boolean algebra*, DIRASAT. A Research Journal, the University of Jordan, XIII (7): pp67-76, Amman, 1986.

[7] Ünlü, F.: *A TASIM Logic realization of Boolean algebra*, DIRASAT. A Research Journal, the University of Jordan, XIV (12): 61-80, Amman, 1987.

[8] Ünlü, F.: *CITALOG: Compact and Integrated Tasim Logic Closure*, Journal of King Abdulaziz University, Science, Vol. 2 pp117-136, Jeddah, 1990.

[9] Ünlü, F.: *Instant (FLA, HOB) Computational Management System KBO Model Design,* Int. Journal of Contemp. Math. Sciences, Vol. 1, 2006, no. 5-8, 223 - 235.

[10] *FTD Grammar Graph*, International Journal of Computer Mathematics, 2003, Vol. 80(1), pp. 1-9.