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THE THEORY OF PROPOSITIONAL LOGICS IN REFERENCE OF STATEMENT CALCULUS

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***ABSTRACT*: In this paper we are trying to prove how to get success through logical approach of validity of argument using truth table and different logical connectives. It will be proved by tautology.**

***KEYWORDS*: Calculus, Inference Calculus, Logics, Principles, Truth Table**

INTRODUCTION

The main function of logic is to provide rules of inference, or principles of reasoning. The theory associated with such rules is known as inference theory because it is connected with the inferring of a conclusion from certain premises. When a conclusion is derived from a set of premises by using the accepted rules of reasoning, then such a process of derivation is called a deduction or a formal proof. An important difference between the reasoning used in any general discussion and that the premises used are believed to be true either from experience or from faith, and if proper rules are followed, then one expects the conclusion to be true. In mathematics, one is solely concerned with conclusion which is obtained by following the rules of logic. In any argument, a conclusion is admitted to be true provided that the premises (assumptions, axioms and hypotheses) are accepted as true and the reasoning used in deriving the conclusion from the premises follows certain accepted rules of logical inference. Such an argument is called sound. In any argument we are always concerned with its soundness. In logic the situation is slightly different, and we concentrate our attention on the study of the rules of inference by which conclusion are derived from premises. Any conclusion which is arrived by following these rules is called a valid conclusion, and the argument is called a valid argument.

PRELIMINARIES

Now we begin with some definitions.
Definition 2.1- **Sentences:** Group of words with proper meaning is called a sentence.

Definition 2.2- **Statements:** All the declarative sentences to which it is possible to assign one and only one of the two possible truth values are called statements. The symbols, which are used to represent statements, are called statement letters usually the letters *P*, *Q*, *R*…, *p*, *q*, *r*, etc. are used.

Definition 2.3- **Logical Connectives:** Logical connectives or sentence connectives are the words or symbols used to combine two sentences or statements to form a compound sentence or compound statements.

Table 1: Logical connectives with their symbols

Connective word	Name of Connectivity	Symbols
Not	*Negation*	~
And	*Conjuction*	˄
Or	*Disjunction*	˅
If…….then	*conditional*	→
Iff	*Bi- conditional*	↔

Definition 2.4- **Tautology:** A statement formula which is true regardless of truth values of the statements which replaces the variable in it is called a universally valid formula or a tautology or logical truth.

Definition 2.5- **Contradiction:** A statement formula which is false regardless of the truth values of the statement which replace the variable in it is called a contradiction.

Definition 2.6- **Validity Using Truth Tables:** Let A and B be two statement formulas. We say that "B logically follows from A" or "B is a valid conclusion of the premise A" iff A → B is a tautology.

MAIN RESULTS -

If we make an aim and work hard to find this aim and also have good luck then we can get success always.
We prove this result by tautology.

Test for validity of the arguments – firstly we see Is it true "we are hardworker and have good luck then we can get success always."

Let p: if we work hard .
Let q : if we have good luck.
Let r: we get success.
Now we construct a truth table for notification (p^q)→r implies that if we are hardworker and have good luck then we can get success always.

p	**q**	**r**	**p^q**	**(p^q)→r**
T	T	T	**T**	**T**
T	T	F	**T**	**F**
T	F	T	**F**	**T**
F	T	T	**F**	**T**
F	F	T	**F**	**T**
F	T	F	**F**	**T**
T	F	F	**F**	**T**
F	F	F	**F**	**T**

Since last column contains Ts and F also, this is a contradiction. Hence the given argument is not valid always.
Now
Let p : if we make a aim .
Let q: if we work hard .
Let r : if we have good luck.
Let s: we get success.
Then we construct a truth table notification (p^q)^r→t implies that if we make an aim and work hard to find this aim and also have good luck then we can get success always.

p	**q**	**r**	**t**	**p^q**	**(p^q)^r**	**(p^q)^r→t**
T	T	T	T	T	T	T
T	T	T	F	T	T	T
T	F	T	T	F	F	T
F	T	T	T	F	F	T
T	T	F	T	T	F	T
T	T	F	F	T	F	T
F	T	T	F	F	F	T
F	F	T	T	F	F	T
F	T	F	T	F	F	T
T	F	T	F	F	F	T
T	F	F	T	F	F	T
F	F	F	T	F	F	T
F	F	T	F	F	F	T
T	F	F	F	F	F	T
F	T	F	F	F	F	T
F	F	F	F	F	F	T

Since last column contains only Ts, hence the given argument is valid. Hence the above-said argument is a valid argument.

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