

SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution) Coimbatore-641035.



UNIT I-LOGICS AND PROOFS

LOGICAL EQUIVALENCE

Tautology: A statement formula which is true always surcespectave of the fourth values of the anderedual variables is called a tautology. F9 : PNTP & a tautology. A statement formula which is always false contra dection : is called a contradiction (on abswidt + y. E9: PATP is a contriadiction. A statement formula which is neithorn Cont goncy: tautology nor contractiction is called contrigency. E9: $P \leftrightarrow a$ is contrigency. J. Show that [IP ∧ (PAQ)] → q is a tautology.

р	9	TP	PAQ	7PA(PAQ)	$[7PA(PAQ)] \rightarrow Q$
Т	T	F	Т	P V	S AT
Т	F	F	F	F Jak	T
F	T	Т	FT	F	Т
F	F	T	F	F	Τ

Since all the entries In the stebulting column is trues the given expression is a tautalogy.

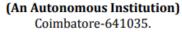
2].	Show	that	(PAQ).	A 7	(PVQ)	均	a	contradiction.

Т	Т	Т	T	(F . (r)).	Star F and
T	F	F	Т	F	F
F	Т	F	Т	F	F
F	F	F	F	т	F uHing whom a contriadiction

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	7	(PVE	0 2) V	(TPV	7Q)	Robert States		T(PVA)
A second second	Р	a	TP	78	PVQ	T(PVQ)	TPVTQ	V(TPVTQ) F
1	T	T	F	F	T	F	F	T
	T	F	F	T	Т	F	T	T
1	F.	T	Т	F	T	F	T	T
L	F	F	T	T	F	Т	T	l

Since the entries in the lesulting column are T as well as F, the given expression is a contrigency.

Enamine	Who the H	[(AVQ) == = +	· [As -> 2g. a fautology?
			1.5

Equil valence:

Two statement formulas p and & are equivalent 9th p (→ a is a tautology. It is denoted by p (⇒ a.

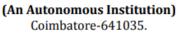
Show that the proposet cons are logically equivalence for the following. (i) $P \rightarrow Q \iff TP \vee Q$ (ii) $P \rightarrow (Q \vee R) \iff (P \rightarrow Q) \vee (P \rightarrow R)$

р	a	⇒ 7PV P→a	JP	TPVA	P→Q ⇔ 7PVQ
Т	T	т	F	Т	TT
Т	F	F	F	F	т
F	T	Т	T	T.	T
F	F	T.	T	AVOT A	(AAA) T toot was

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(n P	Q			$(P \rightarrow P \rightarrow (Q \vee R)$	P→Q	P→R	(7a)	P→ (QVR) ↔ ↔ (P→Q)V(P→R)
T	T	Т	Т	Т	Т	Т	Т	T
/ T	Т	F	T	Т	T.	F	Т	T
- T	F	T	Т	T	F	T	Т	T
F	Т	T	T	T	Т	Т	т	T
T	F	F	F	F	F	F	F	Т
F	F	Τ	T	Т	Т	T	Т	T
F	T	F	T	Т	T	T	Т	T .
F	F	F	F	T. . (QVR)] ↔	T	Т	T	A Trank A

Law Hology. Hence $P \rightarrow (R \vee R) \iff (P \rightarrow R) \vee (P \rightarrow R).$

W W

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