UNIT-OL Mathematical Reasoning

Statement :- A Statement is declarative sentence. i.e.

 $\{x: x^2 = 36\}$, $x \in (6, -6)$

Fruth value

329

True

Statement is denoted by Symbol (=), p.d. v.s. (3).

Logical connectives ?- Logical connectivity are the sucords or symbols used to combine true

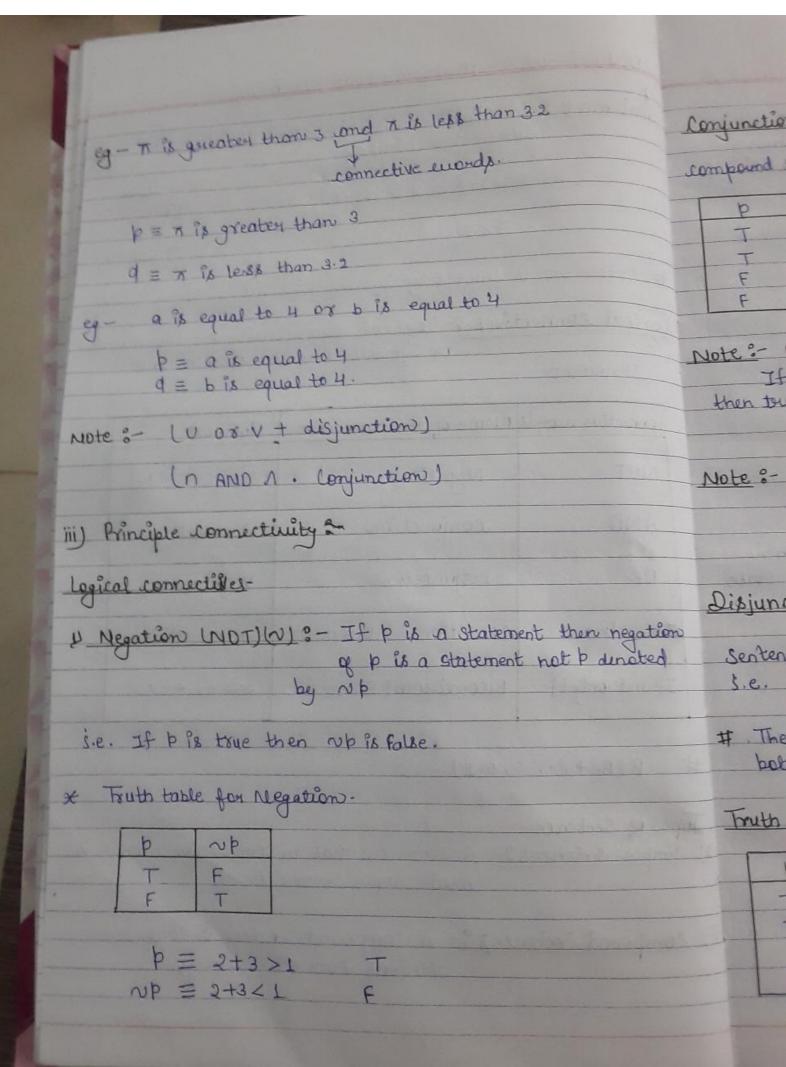
Statement.

Name of the connective	Symbols
Negation	~ 08 -
conjunction	1 meet
Disjunction	v join
conditional statement	→ 108 ⇒
Biconditional Statement	₩ 08 €
	Negation Conjunction Disjunction Conditional Statement

B(B, +, ·, ', 0, 1)

Types of Sentence-1) Simple Sentences: A Sentences has no connective words is Called Simple Sentences.

ii) compound Sentences: - A compound sentence is composed various connective mords.



Conjunction (AND) (1): - If p and q are two statement then conjunction of p and q is compound sentence denoted by paq

	a	Tpnq
P	_ _	T
T	E	F
T		F
F		F

Note: Formula 2" where n is the number of statements.

If compound sentences have two components b and que then touth table has $2^2 = 4$ Rows on pair.

Note: 1) Conjunction, ., A, TT T -> T otherwise F'

ii) Disjunction, +, V, FF -> F otherwise T

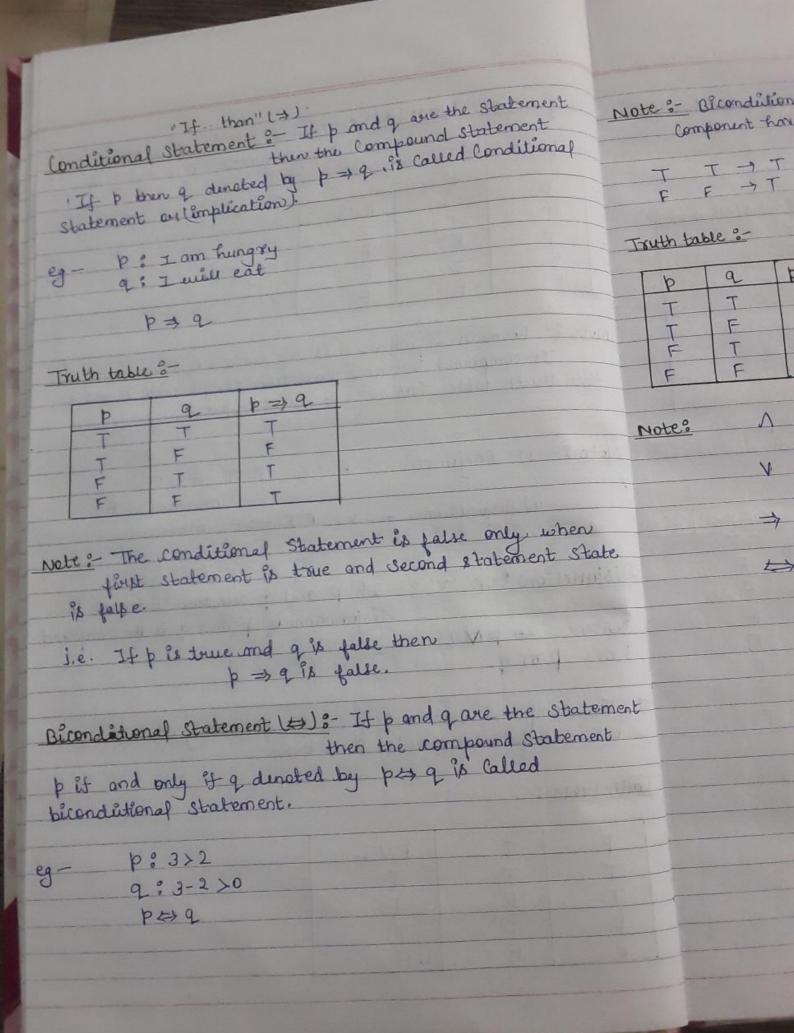
Disjunction or v' ? - If p and q are two statement then disjunction of p and q is the compound sentence do p arq.

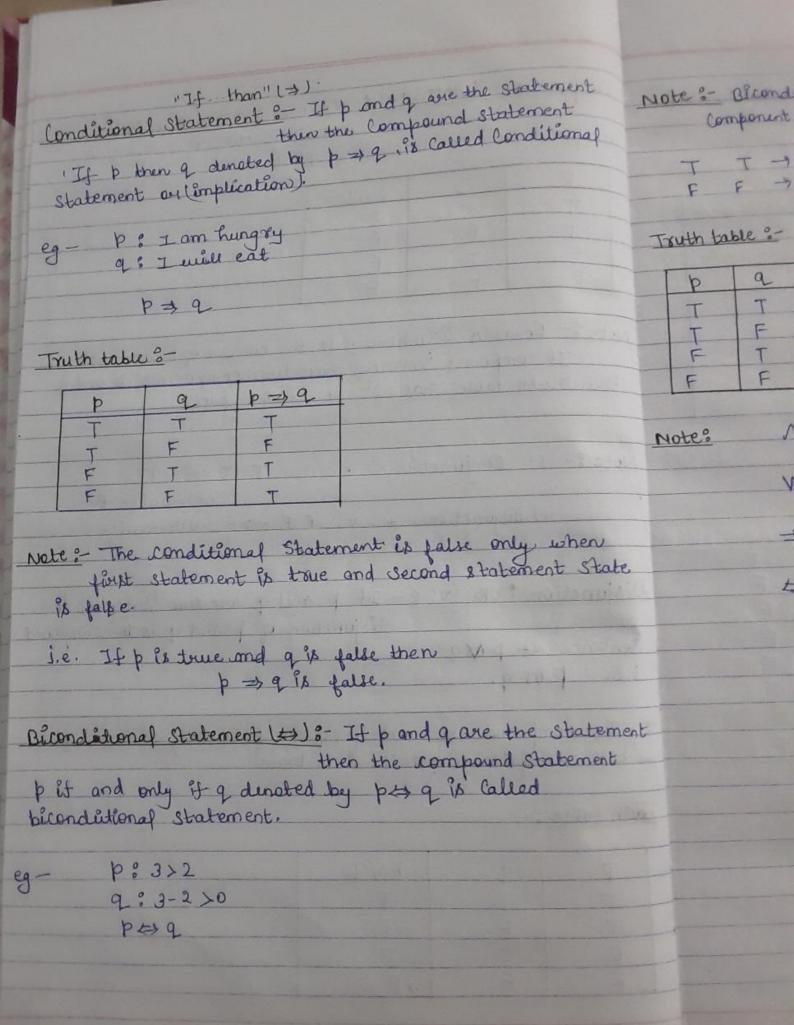
The compound statement prof are false only when prog both are false otherwise it is true.

Truth table :-

egation

n a	pv9
P	T
1 1	T
	T
	F





Note: - Bicondutional Statement is true only when both Component have some value. T -> T ? Here all Condilions have Some value then, -> T I condition la also true, otherwise false. Truth table :pbog p -> T otherwise false conjunction Note: F -> F otherwise True. V disjunction TF >F otherwise true > conditional TT >To otherwise false. ⇒ Biconditional

te.

ent

Q1. (P => QAX) ⇒ (NX → NP) find the touth table don the given statements

Solve-

							la dand	いくとりにしからいから			
ı	b	a	7	NY	200	np	PENANT	1017-1	T		
	-	T	T	4	T	F	T	T	T		
	-	1	F	T	F	F	F	F.			
H	1	-	-	1	C -	E	F	T	T		
	T	F	11	-	0	1	C	F	T		
1	T	F	F	1	F	1	-	-	T		
	F	T	T	F	T	1	F		7	1	
8	E	T	F	T	F	T	T	T		1	
ł	r	E	T	F	F	T	T	T	T	1	
	-	0	6	T	E	T	ET :	T	T	1	
		1	1			-				m4	

8-2- [NPV(p=sr)] 1(r=>9)

Solution-

	b	9	7	NP	PEST	8=>2	NOVPEN	WPV(Rest) M(1=
	T	T	T	F	T	T	T	T
	1	T	f.	. F.	P	+,	F	F
	T	F	T	F	TI	F	T	F
	T	F	F	F	F	T	F	F
	F	T	T	T	F	T	T	T
	F	T.	F	T	T	T	T	T
	F	F	T	T	F	F	T	F
1	F	F	F	T	T	T	T	T
							THE RESERVE OF THE PARTY OF THE	-

Toutalogy :-

eg- prop

PTF

Configercy :-

eg- p => n

PTF

contraduc

eg- p=>~1

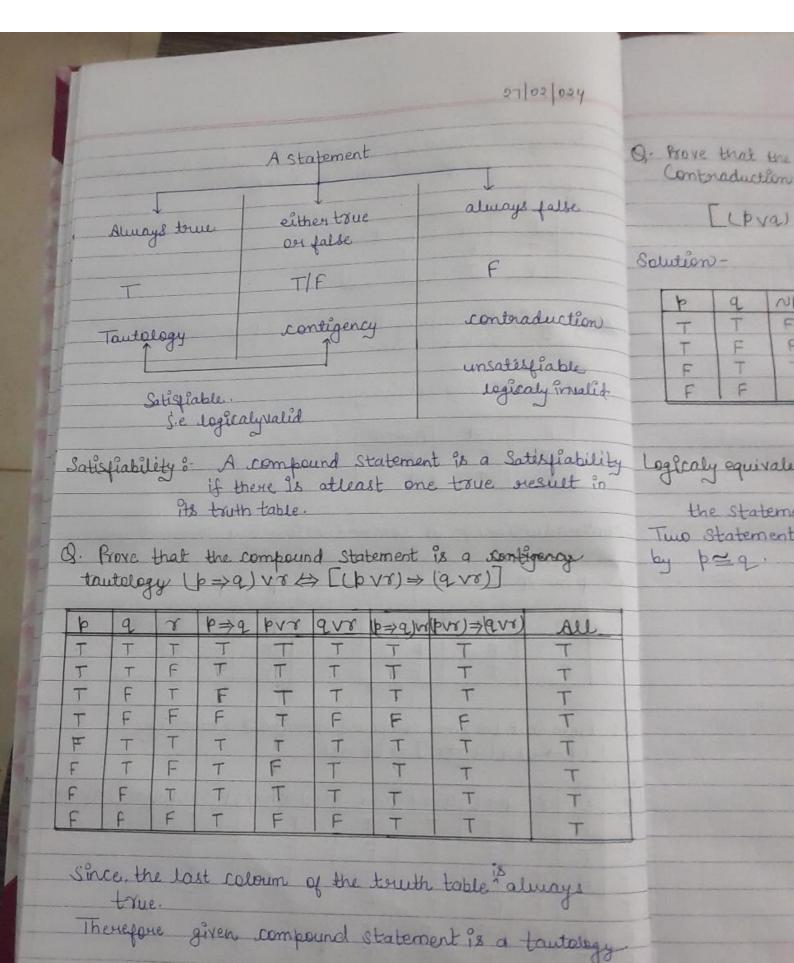
PTF

Q. 1. Prove t

لىللا	ion-	_
P	9	1
T	T	T
T	T	1
T	F	1
T	16	1
E	T	

for the Toutalogy: Tautalogy is a statement which is tour for au possible value of its components. eg- pv. Np pvap => ~ P) F Contigency :- A contigency is a Statement that can be either true or false. p > NP is a contigency. p ⇒ Np F F contraduction: - A contraduction is a Statement which M/ 1(4=16) is false for all possible values q it components. eg- per Np dav d prnp NÞ popup D. 1. Prove that the given compound statement is a tautalogy. [(p→q) 1 (2→r)] → (p→r) Solution-(r+ 9/16+x) (p+9/1(2+x)) +p+x) Q->~ p-19 p+7 F F F

Toutalogy :- Toutalogy is a statement which is tome for an possible value of its components. on the. prnp pvnp Np >~p) T F Contigency :- A contigency is a Statement that can be either time of false. p > NP is a contigency. b=>Nb contraduction :- A contraduction is a Statement which l'A false for all possible values q it components. M(=>9) eg- p=> Np panp PUNA NÞ popup NP F Q. 1. Prove that the given compound Statement is a tautalogy. [(p+q) 1 (2 ->x)] - (p ->x) Solution-(p+9/1/2+x) ((p+9)/(2+x)]-+(p+7) PHY p > 9 8 F F F T



Q. Prove that the compound statement is a contigence Contraduction. [LPVa) N [NP)] N [NA) Schution -[PV9/MP[[PV9)A(NP)]AN9) pva id Logicaly equivalence :- Two statements are called logicaly equivalence if the touth values of both the Statement are always Identical.
Two Statement p & q are equivalent then it is denoted by p=q