



CS & IT ENGINEERING

Mathematical Logic

DPP 03

Discussion Notes

[MCQ]

1. A logically binary relation \otimes is defined as follows:

A	B	$A \otimes B$
True	True	True
True	False	True
False	True	True
False	False	False

 \downarrow $A \wedge B$ \textcircled{T} F F F $A = T \quad B = T$

$$\text{a) } \neg A \otimes \neg B \\ F \otimes F \equiv f \quad \times$$

$$\text{b) } \neg (\neg A \otimes \neg B) \\ \neg (f) \equiv T$$

 $\text{c) } A = T \quad B = T$ $\neg(\neg A \otimes B)$ $\neg(F \otimes T)$ $\neg(T) \equiv f$

Let \sim be the unary negation (NOT) operator with higher precedence than \otimes , which one of the following is equivalent to $A \wedge B$?

- (a) $\sim A \otimes \sim B$
- (b) $\sim [\sim A \otimes \sim B]$
- (c) $\sim [\sim A \otimes B]$
- (d) None of these

[MCQ]

2. Consider the following propositional logic statements which of the

- A: $(\sim p \wedge (p \rightarrow q)) \rightarrow \sim p$ (valid) ✓ $\frac{T}{\sim p}$ $p = T$
- B: $(q \wedge (p \rightarrow q)) \rightarrow \sim p$ ✓ $\frac{q \wedge (p \rightarrow q)}{\sim p} \rightarrow$
- C: $((p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow (p \rightarrow r)$ ✓
 $\frac{T \wedge (T \rightarrow T)}{T \wedge (T \rightarrow T)}$
- D: $((p \vee q) \wedge \sim p) \rightarrow q$

following is contingency?

$$\frac{p \vee q}{\sim p \rightarrow q}$$

$$a = F$$

$$\frac{F \wedge \sim p \rightarrow q}{T}$$

[MCQ]

3. Let p be "I will study discrete math".

Let q be "I will study English literature".

Now, consider the logical statement

"I will study discrete math or I will study English literature"

"I will not study discrete math"

from the given premises, which of the following can be conclusion?

- (a) Therefore, I will not study English literature
- (b) Therefore, I will study English literature. (Ans)
- (c) Both A and B
- (d) None of these.

[MCQ]

4. Which of the following can be the conclusion for the given hypothesis?

Hypothesis: $\neg p \wedge q, r \rightarrow p, \neg r \rightarrow s, s \rightarrow t$

- (a) $r \wedge p$
- (c) s

- (b) $t \checkmark$
- (d) $r \rightarrow s$

$$\frac{\begin{array}{c} \neg p \wedge q \\ p \vee t \end{array}}{\neg p} \quad t$$

$$\frac{\begin{array}{c} \neg p \wedge q \\ r \rightarrow p \\ \neg r \rightarrow s \\ s \rightarrow t \end{array}}{\begin{array}{c} r \vee p \\ r \vee t \end{array}} \quad \left| \begin{array}{c} \neg r \rightarrow s = R \vee s \\ s \rightarrow t = \neg s \vee t \end{array} \right.$$

[MCQ]

5. P_1 : If it rains; the match will not be played

P_2 : The match was played which of the following is valid inference?

- (a) It rains
- (b) It did not rain
- (c) It either rain or did not rain
- (d) None of these

$$\frac{\begin{array}{c} R \rightarrow \neg P \\ \hline P \end{array}}{P} \equiv \frac{\begin{array}{c} P \rightarrow \neg R \\ \hline \neg R \end{array}}{\neg R}$$

