Lecture 4. (A).

Q1:- 47-54 (Problems). Homework.

P20 - Q49:- ⟷ "the System is in multiuser state if and only if it is operating Normally.

→ if the System is operating normally, then Kernel is functioning. the Kernel is not functioning ∨ or the System is in interrupt mode. if the system is not in multiuser state, then it is in interrupt mode. the System is not in interrupt mode.

Solution:- let p: the System is in multiuser state.

q: the System is Operating Normally

r: the Kernel is functioning.

s: the System is in Interrupt mode.

① $p \leftrightarrow q = T$

② $q \rightarrow r = T$

③ $\neg r \vee s = T$

④ $\neg p \rightarrow s = T$

⑤ $\neg s = T$

from ⑤ $s = F$ — ⑥

from ④ & ⑥ $p = T$ — ⑦

from ⑥, ③ $r = F$ — ⑧

from ②, ⑧ $q = F$ — ⑨

from ①

$p \leftrightarrow q = \overline{T}$

$T \leftrightarrow F = T$

$F \neq T.$

Inconsistent.

Knave Knights.

Island.

A says "B is a knight"

B says "the two of us are of opposite type!"

p: A is a knight $\neg p$: A is a knave.

q: B is a knight $\neg q$: B is a knave.

$\Rightarrow q$

$\Rightarrow (p \wedge \neg q) \vee (\neg p \wedge q)$

p: A is a knight $\neg p$: A is a knave

q: B is a knight $\neg q$: B is a knave.

Case 1: A Knight, B Knight.

$q = T$ $p = T$ $\neg p = F$

$(p \wedge \neg q) \vee (\neg p \wedge q) = T$ $q = T$ $\neg q = F$

$\Rightarrow T = T$ ✓

$\Rightarrow (T \wedge F) \vee (F \wedge T) = T$

$F \vee F = T$

$F \neq T$

Case Not hold.

p: A is a knight $\neg p$: — is a knave

q: B is a knight $\neg q$: B is a knave.

A B

CASE2:- Knight. Knave.

$q = T$ $\quad p = T \quad \neg p = F$

$(p \wedge \neg q) \vee (\neg p \wedge q) = F \quad q = F \quad \neg q = T$

$F \neq T$ Not holds.

CASE3:- A Knave. B Knight.

$q = F$ $\quad p = F \quad \neg p = T$

$q = T \quad \neg q = F$

$(p \wedge \neg q) \vee (\neg p \wedge q) = T$

$T \neq F$ Not holds.

CASE4:- A Knave. B Knave.

$q = F$ $\quad p = F \quad \neg p = T$

$q = F \quad \neg q = T$

$(p \wedge \neg q) \vee (\neg p \wedge q) = F$

$F = F$

$(F \wedge T) \vee (T \wedge F) = F$

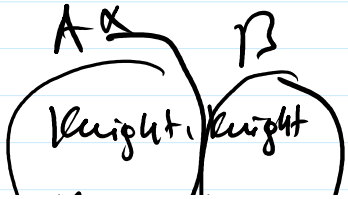
$F \vee F = F$

$F = F$ Holds.

A = Knave.

B = Knave.

CASE4 holds.



CASE 1 holds. (Knight, Knight)

CASE 3 holds. (Knave, Knight)

A is inconclusive.

B is a Knight.

Assume :- Knight are liars.

Knave are truthful.

Book 55-59