49:- The System is in multi user 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.

Sol:-

p = the System is in multi user state.
q = the System is operating Normally.
γ = the Kernel is functioning.
s = the System is in Interrupt mode.

① $p \leftrightarrow q \equiv T$
② $q \rightarrow \gamma \equiv T$
③ $\neg\gamma \vee s \equiv T$
④ $\neg p \rightarrow s \equiv T$
⑤ $\neg s \equiv T$

Rem ⑤ $s \equiv F$ ⑥

Rem ⑥ & ④ $p \equiv T$ — ⑦

Rem ⑥ & ③ $\neg\gamma \equiv T$ — ⑧
$\Rightarrow \gamma \equiv F$.

Rem ⑧ & ②.

$q \equiv F$ — (9)

put (9) & (7) in (1).

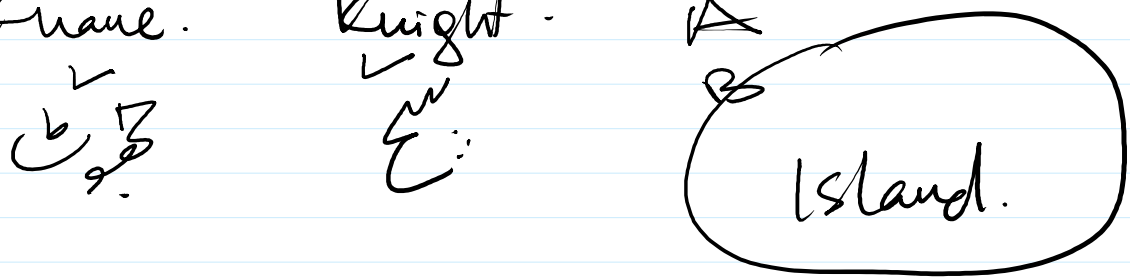
Hence

Contradiction.

$P \equiv T \leftrightarrow q \equiv F$

$\not\equiv T$.

Knave. Knight.



$A \equiv$ B is a Knight

$B \equiv$ The two of us are of opposite type.

$P \equiv$ A is a Knight $\quad \neg P \equiv$ A is a Knave.

$q \equiv$ B is a Knight $\quad \neg q \equiv$ B is a Knave.

q — (1)

$(\neg P \wedge q) \vee (P \wedge \neg q)$ — (2)

$\rightarrow (\neg P \wedge q) \vee (P \wedge \neg q)$ — ②

CASE 1 :- A Knight, B Knight.

$q = T$

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

$P = T \quad \neg P = F$

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

$T = T$ ✓

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

$F \vee F = T \Rightarrow F \neq T$

CASE does not hold.

CASE 2 :- A Knight, B Knave.

$q = T$

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

$P = T \quad \neg P = F$

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

$F \neq T$ Does not hold.

CASE 3 :- A Knave, B Knight.

$q = F$

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

$P = F \quad \neg P = T$

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

?

$(\neg(p \wedge q) \vee (p \wedge \neg q)) \equiv$?

Case 4: Known Known.

$p \equiv q$

$\neg p \equiv \neg q$

$q \equiv$?

$(\neg(p \wedge q) \vee (p \wedge \neg q)) \equiv$?

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