AI Assignment -1

1) Convert the foll. FOL to CNF

(A) $\forall x \left[\exists z \, Animal(z) \wedge Kills(x,z) \right] \Rightarrow \left[\forall y \, \neg loves(y,x) \right]$

① Eliminate implication :- $(A \Rightarrow B \equiv \neg A \vee B$

$\forall x \left[\neg \exists z \, Animal(z) \wedge Kills(x,z) \right] \vee \forall y \, \neg loves(y,x)$

② Move $\neg$ Inwards $\rightarrow \neg \exists x p \equiv \forall x \neg P$

$\forall x \left[\forall z \, \neg (Animal(z) \wedge Kills(x,z) \right] \vee \forall y \, \neg loves(y,x)$

$\forall x \left[\forall z \, \neg (Animal(z)) \vee \neg Kills(x,z) \right] \vee \forall y \, \neg loves(y,x)$

③ Remove/Drop Universal quanti.

$\left[\neg Animals(z) \vee \neg Kills(x,z) \right] \vee \neg loves(y,x)$

④ CNF →

$\neg Animal(z) \vee \neg Kills(x,z) \vee \neg loves(y,x)$

2.) Convert the sentences into FOL & prove using Sol.

Rules & facts :-

① Cold & precipitation $\longrightarrow$ Snow

$Cold(x) \wedge precipitation(x) \Rightarrow Snow(x)$

$\neg (Cold(x) \wedge precipitation(x) \vee snow(x)$

$\neg \, cold(x) \, \bullet \vee \neg precipitation(x) \vee snow(x)$

② January $\longrightarrow$ cold

$January(x) \Rightarrow cold(x)$

$\neg January(x) \vee cold(x)$

③ clouds $\longrightarrow$ precipitation

clouds (x) $\implies$ precipitation(x)

$\neg$ clouds (x) $\lor$ precipitation (x)

④ January (x)

⑤ clouds (x)

To prove : snow (x)

$\longrightarrow$ Resolution of ① & ②

⑥ $\neg$ Precipitation (x) $\lor$ snow(x) $\lor$ $\neg$ January (x)

$\longrightarrow$ Resolution of ⑥ & ④

⑦ $\neg$ Percipitation (x) $\lor$ snow (x)

$\longrightarrow$ Resolution of ⑦ & ③

⑧ Snow (x) $\lor$ $\neg$ Clouds (x)

$\longrightarrow$ Resolution of ⑧ & ⑤

⑨ Snow (x)

Hence Proved.