**4.Sol** (t → (r ꓦ p)) ((r ꓦ k) Λ k) (t → (r ꓦ p)) ꓦ ((r ꓦ k) Λ k) **(a b ≡ a ꓦ b**)

(t ꓦ (r ꓦ p)) ꓦ ((r Λ k) ꓦ (k Λ k)) **(a b ≡ a ꓦ b)** **(Using distributive law)**

((t) Λ (r Λ p)) ꓦ ((r Λ k) ꓦ F) **(Using Negation law)**

(t Λ (r Λ p)) ꓦ (r Λ k) **(Using Double Negation law) (Using Identity law)**

(t Λ (p Λ r)) ꓦ (k Λ r)

((t Λ p) Λ r) ꓦ (k Λ r) **(Using Associative law)**

((t Λ p) ꓦ k) Λ r **(Using Distributive law)**

(t → (r ꓦ p)) ((r ꓦ k) Λ k) ((t Λ p) ꓦ k) Λ r

Now to prove given Compound Preposition implies r it is enough to prove the

proposition

**(((t Λ p) ꓦ k) Λ r) r** is a Tautology

(((t Λ p) ꓦ k) Λ r) r (((t Λ p) ꓦ k) Λ r) ꓦ r **(a b ≡ a ꓦ b)**

(((t ꓦ (p)) Λ ¬(k)) ꓦ ¬(r)) ꓦ r

(((t ꓦ p) Λ k)) ꓦ r) ꓦ r **(Using Double negation law)**

((t ꓦ p) Λ k) ꓦ (r ꓦ r) **(Using Associative law)**

((t ꓦ p) Λ k) ꓦ T **(Using Negation law)**

((t ꓦ p) Λ k) ꓦ T ≡ T **(Using Domination law)**

Hence given ((t → (r ꓦ p)) ((r ꓦ k) Λ k)) → r is a Tautology