Page No.	
Date	

5. $S \cap T \subset S$, $S \cap T \subset T$.

6. $S_\lambda \subset \bigcup_{\lambda \in \Delta} S_\lambda$ for each $\lambda \in \Delta$

7. $\bigcap_{\lambda \in \Delta} S_\lambda \subset S_\lambda$ for each $\lambda \in \Delta$

8. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

9. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

10. (De Morgan's Laws)

if S and T be any two subsets of a set X. Then

(i) $X \setminus (S \cup T) = (X \setminus S) \cap (X \setminus T)$

(ii) $X - (S \cap T) = (X \setminus S) \cup (X - T)$.

Proof 10(i) We Recall that

$$A = B \iff A \subset B \text{ and } B \subset A.$$

(i) (TS): $X \setminus (S \cup T) = (X - S) \cap (X - T)$

let $x \in X \setminus (S \cup T) \iff x \in X$ but $x \notin S \cup T$

$\iff x \in X$ but $x \notin S$ & $x \notin T$

$\iff x \in X \setminus S$ and $x \in X - T$

$\iff x \in (X - S) \cap (X - T)$

Hence $\boxed{X \setminus (S \cup T) = (X - S) \cap (X - T)}$

(ii) (TS):- $X \setminus (S \cap T) = (X \setminus S) \cup (X - T)$

let $x \in X \setminus (S \cap T) \iff x \in X$ but $x \notin S \cap T$

$\iff x \in X$ but $x \notin S$ or $x \notin T$

$\iff x \in X \setminus S$ or $x \in X - T$

$\iff x \in (X \setminus S) \cup (X - T)$

i.e, $X - (S \cap T) = (X \setminus S) \cup (X - T)$.

(11) The above laws can be generalise as follow:-

(i) $X \setminus \left[\bigcup_{\lambda \in \Delta} S_\lambda\right] = \bigcap_{\lambda \in \Delta} (X - S_\lambda)$

(ii) $X - \left[\bigcap_{\lambda \in \Delta} S_\lambda\right] = \bigcup_{\lambda \in \Delta} (X \setminus S_\lambda)$ (Here each S_λ is a subset of X)