1) write truth tables of $p \wedge q$, $p \veebar q$, $p \to q$, $p \leftrightarrow q$

2) If p: A circle is a conic

q: $\sqrt{5}$ is an irrational number

r: exponential series is convergent.

express following compound proposition in words

a) $p \wedge (\sim q)$ b) $(\sim p) \vee q$ c) $p \veebar (\sim q)$

d) $\sim p \Leftrightarrow (q \wedge (\sim r))$

3) P.T for any propositions p, q, r the compound proposition.

a) $\{(p \to q) \wedge (q \to r)\} \to (p \to r)$

b) $\{p \to (q \to r)\} \to \{(p \to q) \to (p \to r)\}$ is a Tautology.

4) Prove the following logical equivalence without using truth table

a) $[(p \vee q) \wedge (p \vee \sim q)] \vee q \Leftrightarrow p \vee q$.

b) $[p \vee q \vee (\sim p \wedge \sim q \wedge r)] \Leftrightarrow p \vee q \vee r$.

5) obtain PCNF, PDNF of the following

a) $p \Leftrightarrow q$. b) $\sim (p \vee q)$ c) $(\sim p) \wedge q$.

6) Test the validity of following arguments.

a)
$$\begin{array}{l} p \to (q \to r) \\ \sim q \to \sim p \\ p \\ \hline \therefore r \end{array}$$

b)
$$\begin{array}{l} (\sim p \vee q) \to r \\ r \to s \vee t \\ \sim s \to \sim u \\ \sim u \to \sim t \\ \hline \therefore p. \end{array}$$

7) P.T $R \to S$ is a valid conclusion from the premises $P \to (Q \to S)$; $\sim R \vee P$; and Q.

8) Prove by mathematical induction.

a) $1+2+2^2+ - - +2^n = 2^{n+1}-1$

b) n^3+2n is divisible by '3'.

c) $n < 2^n$ $\forall$ positive integral values of n.

9) let $U = \{1,2,3,4,5,6,7,8,9\}$; $A = \{1,2,3,7\}$

$B = \{4,5,6,7\}$; $C = \{1,3,6\}$; $D = \{6,8,9\}$, compute the following. a) $\overline{A \cup C}$ b) $B \cup \overline{D}$ c) $A \cap (B \cup C)$.
d) $(A \cap B \cap C)$ e) $\bar{A} \triangle \bar{C}$ f) $A \triangle B$. g) $A - B$

10) for any three sets A, B, C. Prove the following

a) $(A \cup B) \cup C = A \cup (B \cup C)$

b) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

c) $\overline{A \cup B} = \bar{A} \cap \bar{B}$.

d) $(A - B) \cap (A - C) = A - (B \cup C)$.