



Course Name: **Discrete Mathematical Structure**

Course Code: **CSET106**

Academic Year: 2023-24

Semester: Even

Date: January 17, 2024

Type: 3-1-0

Tutorial Sheet: **2**

CO-mapping: All the questions are mapped to CO-1.

Objectives: Students will be able to apply propositional Logic to designing computer circuits, to construct computer programs, to build expert systems etc.

1. Given that the value of $p \rightarrow q$ is true, determine the value of $\neg p \vee (p \leftrightarrow q)$?
2. If there are 4 propositions (p, q, r, s), how many possible combinations of T/F values are there?
3. Write the converse, inverse and contrapositive of the conditional statement "if $2+2=4$ then I am not the Prime Minister of India."
4. Let p be the proposition "Mathematics is easy" and let q be the proposition "five is greater than four". Write the following statements in the symbolic form:
 - (a) Mathematics is easy and five is greater than four.
 - (b) Mathematics is easy or five is greater than four.
 - (c) Either Mathematics is not easy or five is not greater than four.
 - (d) Mathematics is not easy and five is not greater than four.
 - (e) Either Mathematics is easy and five is not greater than four or Mathematics is not easy and five is greater than four.
5. Write the negation of each of the following statements:
 - (a) $2+7 < 13$
 - (b) No nice people are dangerous.
6. Let p be the statement "Ravi is rich" and let q be the statement "Ravi is happy". Write in the English proposition, which corresponds to each of the following:
 - (a) $\neg p \wedge q$
 - (b) $p \vee \neg q$
 - (c) $\neg p \wedge q$
 - (d) $\neg p \vee (p \wedge \neg q)$
7. Given the truth values of p and q as true and those of r and s as false, find the truth values of the following:
 - (a) $p \vee (q \wedge r)$
 - (b) $(p \wedge (q \wedge r)) \vee \neg((p \vee q) \wedge (r \vee s))$

8. Construct the truth table for the following:

(a) $[p \wedge (p \rightarrow q)] \rightarrow q$

(b) $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$

(c) $(p \rightarrow q) \wedge (\neg p \rightarrow r)$

(d) $(p \leftrightarrow q) \vee (\neg q \leftrightarrow r)$

(e) $(\neg p \leftrightarrow \neg q) \leftrightarrow (q \leftrightarrow r)$

“Dream is not that which you see while sleeping it is something that does not let you sleep.”

A.P.J. Abdul Kalam

