

M.M. ENGINEERING COLLEGE, MULLANA (AMBALA)**DEPARTMENT OF CSE****Tutorial / Assignment Sheet No. : 2.2**Branch / Semester: CSE / 4th

Course Name: Discrete Mathematics

Course Code: BCSE-508

Topics covered: Propositional Logic- Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Tautology, Contradiction, Logical Equivalence- The Laws of Logic, Logical Implication (Unit-2)

Date of Release: 18.02.2021

Last date of submission: 01.03.2021

Total Marks: 30

Assignment Outcomes:

- i) Able to understand the application of Propositions & solve propositions related problems.
- ii) Able to map and solve real life problem using the concepts of Propositional logic.

Q. No.	"All Questions are compulsory"	Marks
Section-A (Each question of 1 mark)		
1.	Which of the following are propositions (statements): i) Take 5 mangoes. ii) India is a democratic country.	1
2.	What is negation of the statement "2 is even or -3 is negative"?	1
3.	Determine the truth value of following statements: i) $4 + 2 = 5$ and $6 + 3 = 9$ ii) $3 + 2 = 5$ and $4 + 7 = 11$.	1
4.	Rewrite sentence "If productivity increases, then wages rise" without using the conditional connective.	1
5.	Find out whether $p \rightarrow q$ is equivalent to $\neg q \rightarrow \neg p$ or not.	1
6.	Write down contrapositive of sentence "If John is a poet, then he is poor".	1
Section-B (Each question of 2 mark)		
7.	Let p denote "He is rich" and q denote "He is happy". Write following statements in symbolic form using p and q: i) If he is rich, then he is unhappy. ii) He is neither rich nor happy. iii) It is necessary to be poor in order to be happy. iv) To be poor is to be unhappy.	2
8.	Write a compound statement that is true when exactly two of the three statements p, q, r is true.	2
Section-C (Each question of 4 mark)		
9.	Which of the following propositions are tautology, contradiction or contingency: i) $q \vee (\neg q \wedge p)$ ii) $p \rightarrow (q \rightarrow p)$ iii) $(q \wedge p) \vee (q \wedge \neg p)$ iv) $(a \vee b) \leftrightarrow [((\neg a) \wedge c) \rightarrow (b \wedge c)]$	4
10.	Write the converse and inverse of following statements: i) Indian team wins whenever match is played in Kolkata, home town of Ganguly. ii) $ AB ^2 + BC ^2 = AC ^2$ whenever ABC is a right-angled triangle.	2 2
Section-D (6 mark question)		
11.	Determine the validity of following arguments: i) All my friends are musicians. John is my friend. None of my neighbors are musicians. John is not my neighbor. ii) If I study, then I will not fail mathematics. If I do not play cricket, then I will study. But I failed mathematics. Therefore I must have played cricket. iii) If 7 is less than 4, then 7 is not a prime number. 7 is not less than 4. 7 is prime number.	6
	iv) If two sides of a triangle are equal, then the opposite angles are equal. Two sides of a triangle are not equal. The opposite angles are not equal. v) $p \rightarrow q$ $q \rightarrow r$ $p \rightarrow r$ vi) If a man is a bachelor, he is unhappy. If a man is unhappy, he dies young. Bachelors die young.	
12. a)	A library has two kinds of employees. A person from the first kind always tells truth while the other kind of person always lies. When you visit the library to find whether Discrete Mathematics book is available (on shelf), person of library at counter Mr. X answers as 'The Discrete Mathematics book is available if and only if I always tell truth'. How will you confirm whether the book is available or not?	2
b)	A certain country is inhabited by people who either always tell truth or always lie, and also they will respond to questions only with 'yes' or 'no'. A tourist comes to a fork in the road, where one branch leads to capital and other does not. There is no sign indicating which branch to take, but there is an inhabitant Mr. Z standing at the fork. What a single question should tourist ask him to determine which branch to take?	2
c)	There are two shopping malls next to each other, one with sign board as 'Good items are not cheap' and second with sign board as 'Cheap items are not good'. Do they mean same?	2

Note for students: Students are required to submit handwritten solutions of given assignment / tutorial sheet on or before Last date of submission otherwise penalty in terms of deduction in marks will be made as per following rule:

If submitted on or before last date then Deduction of marks = 0

If submission delayed by (1-7) days then Deduction of marks = 5

If submission delayed by (8-14) days then Deduction of marks = 10

If submission delayed by more than 15 days then Deduction of marks = 12.5