NIRMA UNIVERSITY



Institute Of Technology, Ahmedabad

B.Tech. 3rd CE (ODD 2020-21)

2CS305: Discrete Mathematics (Tutorial)

Topic-Propositional Logic

Q.1 Let p be “It is cold” and let q be “It is raining”. Give a simple verbal sentence which describes each of the following statements:

(a) ¬ p



(b) p ˄ q



(c) p ˅ q



(d) q ˅ ¬ p



Q.2 Determine the truth value of each of the following statements:



(a) 4+2 = 5 and 6+3 = 9



(b) 4+5 = 9 and 1+2 = 4



(c) 3+2 = 5 and 6+1 = 7



(d) 3+2 = 5 and 4+7 = 11



(e) 4+2 = 5 or 6+3 = 9



(f) 4+5 = 9 or 1+2 = 4



(g) 3+2 = 5 or 6+1 = 7



(h) 3+2 = 5 or 4+7 = 11



Q.3 Find the truth table of ¬ (p ˄ q).



Q.4 Check whether proposition p˅¬ (p ˄ q) Tautology or not.



Q.5 Check whether proposition p ˄ ¬ (p ˅ q) Tautology or not.



Q.6 Check whether propositions ¬ (p ˄ q) and (¬ p ˅ ¬ q) are logically equivalent or not.



Q.7 Simplify the proposition: ¬ (p ˅ q) ˅ (¬ p ˄ q)



Q.8 Determine the contrapositive of each statement:



(a) If John is a poet, then he is poor.



(b) Only if Marc studies will he pass the test.



Q.9 Check whether the following propositions are:

(i) Tautology (ii) Contradiction (iii) Contingency



(a) (p ˄ q)🡪 (q ˅ r)



(b) (p 🡪 q)🡪 (q 🡪 r)



(c) p ˄ ¬ (p ˅ q)



(d) (a 🡪(b˅ c))🡪 ((a˄b) 🡪 c)



(e) a🡪 ¬a

(f) (a🡪 ¬a)˅ (¬a🡪 a)



Q.10 Determine whether the following is tautology, contradiction or contingency.

(a) (¬p˄(p🡪q))🡪¬q

(b) (¬q˄(p🡪q))🡪¬p

Simplify the above propositions :

p🡪q ca be simplified as ~pVq