Academic Year: 2024/2025	Department of Computer Science
Second Year L.M.D-Computer Science	Module: Mathematical Logic

Final Exam

First name ……………………………………last name……………………………………. group ………………………………………

Exercise N : 01   (10 points)

Put a circle on the correct answer(s)?

<u>1.</u> the formula A is

      a. a literal   ;   b. a clause ;   c . a logic variable

2. the two following causes: ¬AVB *and* AVC are

a. complementary clauses   ;   b. resolvent clauses   ;   c. empty clauses

3. The formula ¬A VA is a

a.. tautology   ;   b. valid   :   c . antilogy ;   d. consistency; E. contingent

4. The formula ¬B⇒¬A is

a. the converse of A ⇒B ;   b. the inverse of A ⇒B ; c. the contrapositive of A ⇒B

5 . the general inference rule applied on

    a.   Two complementary clauses;   b. two conjunctive clauses ;   c. literal and its negation

6. a consistent formula can be

a. tautology formula ;   b. valid formula   ;   c. contingent formula

7. B ∧ C ⊨A⇒ (B ∧ C) it is read
a. B ∧ C is a logic consequence of A⇒ (B ∧ C) ; b. A⇒ (B ∧ C) is a logic consequence of B ∧ C
8   *16* interpretations is the true number of a formula with

    a.   *3* logic variables ; b. *4* logic variables ; c *2* logic variables ; d *5* logic variables

9 The formula A ⇔ (B ∧ C) is logically equivalent to
    a.   ((A⇒ (B ∧ C)) ∧((B ∧ C)⇒ A))) ; b ((A⇒ (B ∧ C)) V((B ∧ C)⇒ A))) ; c ((¬AV(B ∧ C)) ∧((¬BV ¬C)V A)))
10. B ∧ C ⊨A⇒ (B ∧ C) if

a .Each model of B ∧ C is a model of A⇒ (B ∧ C) ; b. Each model of A⇒ (B ∧ C) is a model of B ∧ C

Exercise N : 03(05 points)

F is a logic function with eight interpretations, F is true when the disjunction between two logic variables is true.

1.   Construct the truth table of F?
2.   Give The CNF and the DNF of F ?
3.   Determine whether F is a tautology, satisfiable, unsatisfiable?

.The truth table

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2. CNF and DNF

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3. Tautology ,satisfiable, unsatisfiable (without justification)

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Exercise N : 02(05 points)

We define the Sheffer connector, denoted by " | " (Sheffer bar), which is the NAND (not and), by: $p|q \equiv \neg\,(p \wedge q)$

1. Construct the truth table for the formula (p|q).
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2. Construct the truth table for the formula ((p|q)|(p|q)).
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3. Express the connectors $\neg$, $\vee$, and $\rightarrow$ using the Sheffer bar.
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