Kingdom of Saudi Arabia
Ministry of Higher Education
College of computer
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بسم الله الرحمن الرحيم

المملكة العربية السعودية
وزارة التعليم العالي
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Course: MATH 212 "Discrete Mathematics" First semester 1440/1441 Mark_____/40	Final Exam Duration: 2 hours Thursdayday 26/12/2019

Name : **ID:**

Question 1: For every question below, choose ONE answer ONLY: **(6 m)**

1. The identity, a + (b + c) = (a + b) + c is known as:
(a) De Morgan's law. (b) Distributive law. (c) Associative law. (d) Commutative law.

2. Consider a universe U = {1,2,3,…,10). Let A={2, 4,7,10) and B={1,2,3,4,5), C={2,4,6,8). Which of the following is correct?
(a) $A \cup B = \{1,4,5,7,10\}$. (b) $(A \cap B) - C = \emptyset$ (c) $\overline{A \cap B} \cup C = \{2,3,4,5,6,8,9,10\}$ (d) $B \cap C = \{2,3,4\}$

3. Assume that P and R are false and Q is true, and let F stand for false while T stand for true. Find the truth values of the following four propositions:
(P => Q) => (Q => R) , (P => Q) => R , P => (Q => R) , Not (P => Q)
(a) FTTF (b) TFTT (c) FFTF (d) TFFT

4. What is the contrapositive of "The ground is wet whenever it is raining"?
(a) If the ground is not get wet, then it did not rain.
(b) If the ground is wet, then it is rained.
(c) If it rained, then the ground is wet.
(d) If it did not rain, then the ground is not wet

5. The domain D of the relation R is defined as the.... ?
x a) Set of all elements of ordered pair which belongs to R .
b) Set of all last elements of ordered pair which belongs to R.
c) Set of all first elements of ordered pair which belongs to R.
d) None of these.

6. In a connected graph between every pair of vertices there is :
a) A self-loop. b) Exactly one path. c) Two circuits. d) n number of paths.

Question 2: **(4 m)**

Let the propositions: p : "x is a Muslim" and q : "x is like a Prophet Mohammed" and the domain consists of all people.
Write these propositions using p and q and logical connectives.
a) Every Muslim is like Prophet Mohammed.
b) Every person is a Muslim and like Prophet Mohammed."
c) There exist a person, if he/she is a Muslim, then he/she is like Prophet Mohammed.
d) No Muslim is dos not like Prophet Mohammed

a) $\forall x\,(P(x) \rightarrow q(x))$

b) $\forall x\,(P(x) \wedge q(x))$

c) $\exists x\,(P(x) \rightarrow q(x))$

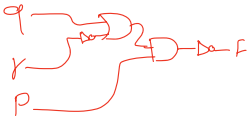
d) $\forall x\,(P(x) \rightarrow q(x))$

Question 3: Answr the following questions? **(5+ 4 m)**

a) Use a truth table to verify the following conditional statement:

$$(p \to q) \wedge (p \to r) \equiv p \to (q \wedge r)$$

b) Construct a combinatorial circuit using inverters, OR gates, and AND gates that produces the output $\neg(p \wedge (q \vee \neg r)$ from input bits p, q and r.



Question 4: Use mathematical induction to prove that for every integer n ≥ 1 **(6 m)**

$$1.2 + 2.3 + \cdots + n(n+1) = n(n+1)(n+2)/3.$$

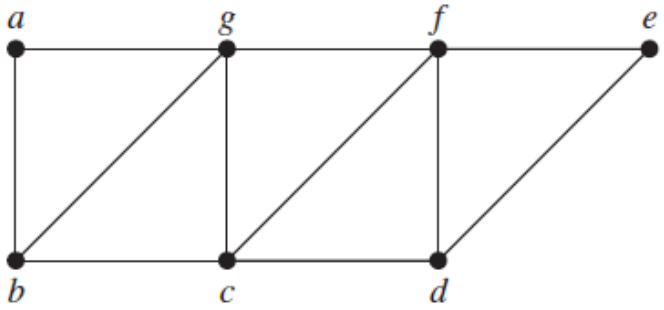
Question 5: **(4 m)**

Determine whether the relation R in the set of all integers is reflexive, symmetric, antisymmetric, and/or transitive, where " x R y iff x . y ≥ 1" for x, y ∈ Z.

Not: Explain youe answer

Question 6: Answr the following questions? **(2+ 6 + 3 m)**

1. What is the Differentiate between **Eulerian pat** and **Hamiltonian path** in a simple Graph G .
2. Given the following graph:



a) Is there an Eulerian circuit in the graph ? Explain your answer?
b) Is there an Eulerian path in the graph ? Construct such a path when one exists ?
c) Is there a Hamiltonian circuit in the graph ? Construct such a circuit when one exists ?

3) Show that the given graph satisfied the ***Handshaking Theorem.***

