HADHRAMOUT UNIVERSITY
COLLEGE OF COMPUTERS & INFORMATION TECHNOLOGY
MONTHLY TEST

Academic year: *2022-2023*
Semester: *First*
Department: CS (General)
Level: 1
Form A
Name Sara Lutf Belfaqih

Subject: Discrete Structure
Examiner: Mr. Zaher Bamasood
Day and Date: *29/11/2022*
Time allowed: 1 hour

Question 1 (10 Marks):

1. Which of these sentences are propositions? What are the truth values of those that are propositions?
   a. Please, take my pencil not propositions
      Truth Value:
      If not why? because it's a require
   b. Mukalla is not the capital of Hadhramout. proposition
      Truth Value: false
      If not why?
   c. $2^6 \geq 100$. proposition
      Truth Value: ~~True~~ False
      If not why?
   d. The summer in Aden is very Hot. proposition
      Truth Value: True
      If not why?
2. Let p and q be the propositions
   p : It is below freezing.
   q : It is snowing.
   Write these propositions using p and q and logical connectives (including negations):.
   a. Either it is below freezing or it is snowing, but it is not snowing if it is below freezing.
      $(p \vee q) \wedge (p \rightarrow \neg q)$
   b. That it is below freezing is necessary and sufficient for it to be snowing.
      $p \leftrightarrow q$
   c. It is not below freezing and it is not snowing
      $\neg p \wedge \neg q$

Question 2 (10 Marks): Note: $p \rightarrow q \equiv \neg p \vee q$

1. **Construct a truth table for each of these compound propositions:**
   a. $(p \rightarrow q) \wedge (\neg p \oplus r)$
   b. $\neg(p \leftrightarrow q) \vee (\neg p \leftrightarrow q)$
2. **Show that $(p \wedge q) \rightarrow p$ is a tautology without using truth tables**

Question 3 (10 Marks):

1. Define contradiction
   a compound proposition that is ~~always~~ always False
2. Let P (x) be the statement "x spends more than five hours every weekday in class," where the domain for x consists of all students. Express $\forall x \neg P(x)$ in English.
   All students don't spend more than five hours every weekday

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MONTHLY TEST

25/30

Academic year: *2022-2023*
Semester: *First*
Department: **IT**
Level:1

Form B

Name: Muna Majdi Marrai

Subject: Discrete Structure
Examiner: Mr. Zaher Bamasood
Day and Date: *1/12/2022*
Time allowed: 1 hour

Question 1 (10 Marks):

1. Let p and q be the propositions
   p: You were born in Yemen.
   q: You are a citizen of this country.
   Write these propositions using p and q and logical connectives (including negations):.
   a. Born in Yemen is necessary and sufficient for being a citizen of this country.

   $p \leftrightarrow q$

   b. You were not born in Yemen but you are a citizen of this country.

   $\neg p \wedge q$

   c. If you were born in Yemen, then you will not be a citizen of this country

   $p \rightarrow \neg q$

1. Which of these sentences are propositions? What are the truth values of those that are propositions?
   a. Mukalla is not the capital of Hadhramout.
      Truth Value: F
      If it is not proposition, say why?
   b. The color of the sky is blue.
      Truth Value: T
      If it is not proposition, say why?
   c. $2^n > 5$.
      Truth Value:
      If it is not proposition, say why? Because the truth value depends on(n) value
      Or, Because it involving one variable(n)
   d. Please, give me a cup of tea
      Truth Value:
      If it is not proposition, say why? Because it is a request

Question 2 (10 Marks):

1. **Construct a truth table for each of these compound propositions:**
   a. $\neg p \oplus \neg (p \vee q)$
   b. $(\neg p \wedge \neg q) \rightarrow (p \vee \neg q)$
2. **Show that $(p \wedge q) \rightarrow (p \rightarrow q)$ is a tautology without using truth tables**
   (Note: $p \rightarrow q \equiv \neg p \vee q$)

Question 3 (10 Marks):

1. Define **Contradictions**

   A compound proposition that is always false

2. Translate $\neg\exists x(C(x) \rightarrow F(x))$ into English, where $C(x)$ is "x is a comedian" and $F(x)$ is "x is funny" and the domain (x) consists of all people.

   if x is a comedian then x is funny

   There isn't any people such that if x is a comedian then x is funny

(Q2) 1. a) $\neg p \oplus \neg(p \vee q)$

p	q	$\neg p$	$p \vee q$	$\neg(p \vee q)$	$\neg p \oplus \neg(p \vee q)$
T	T	F	T	F	F
T	F	F	T	F	F
F	T	T	T	F	T
F	F	T	F	T	F

b.) $(\neg p \wedge \neg q) \rightarrow (p \vee \neg q)$

p	q	$\neg p$	$\neg q$	$\neg p \wedge \neg q$	$p \vee \neg q$	$(\neg p \wedge \neg q) \rightarrow (p \vee \neg q)$
T	T	F	F	F	T	T
T	F	F	T	F	T	T
F	T	T	F	F	F	T
F	F	T	T	T	T	T

↓ tautology

2) $(p \wedge q) \rightarrow (p \rightarrow q)$

$\equiv \neg(p \wedge q) \vee (\neg p \vee q)$ (Note)

$\equiv (\neg p \vee \neg q) \vee (\neg p \vee q)$ (Demorgan law)

$\equiv (\neg q \vee q) \vee (\neg p \vee \neg p)$ (Assosiative law)

$\equiv T \vee \neg p$ (negation law / Idempotent law)

$\equiv T$ (Domination law)

10
10