Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Midterm Examination, Summer 2020 @ DIU Blended Learning Center

Course Code: CSE131 (Day), Course Title: Discrete Mathematics

Level: 1 Term: 3 Section: PC-B

Instructor: TK Modality: Open Book Exam

Date: 9 July, 2020 Time: 02:00 - 06:00pm

Four hours (4:00) to support online open/case study-based assessment Marks: 25

Directions:

- **Students need to go through all the questions shown in this exam paper and answer all.**
- **Analyze and answer specific section based on your own thinking and work.**
- **Do not share as this will be treated as plagiarism by Blended Learning Center.**

1. a) Suppose that during the most recent fiscal year, the annual revenue of Acme Computer was 138 billion dollars and its net profit was 8 billion dollars, the annual revenue of Nadir Software was 87 billion dollars and its net profit was 5 billion dollars, and the annual revenue of Quixote Media was 111 billion dollars and its net profit was 13 billion dollars. Determine the truth value of each of these propositions for the most recent fiscal year. **2+3**

i) If Quixote Media had the smallest net profit, then Acme Computer had the largest annual revenue.
ii) Nadir Software had the smallest net profit if and only if Acme Computer had the largest annual revenue.

b) Determine whether the following preposition is tautology, contradiction or contingency and explain the answer by your own words.

$$(p \leftrightarrow q) \oplus \neg(q \rightarrow p)$$

2. a) Construct a truth table for the following statement: **2.5+2.5**
If you have the flue then you do not pass the course or if you miss the final examination then you do not pass the course.
Construct the proposition by your own. Determine whether the preposition is tautology, contradiction or contingency and explain the answer by your own words.

b) Determine the truth value of each of these statements if the domain for all variables consists of all integers.

$$\forall_n (n^2 \geq n)$$

Explain your answer with example by your own. Make sure that your answer is not similar with anyone.

3. **3+2**
a) Let P(n) be the proposition that all the horses in a set of n horses are the same color.

All the horses in any set of k horses are the same color. Consider any k+1 horses; number these as horses 1,2,3,...,k,k+1. Now these horses all must have the same color, and the last k of these must also have the same color. Proof that all the horses are same color by mathematical induction.

b) Elements of set A is 1^{st} and 4^{th} digit of your four digit ID number and elements of set B is 2^{nd} and 3^{rd} digit of your four digit ID number. For example: If your ID is 123-15-1234 then

A={1, 4}
B={2, 3}

Now prove if A×B = B ×A

Before answering this question write your ID

4. **4**

a) Consider these functions from the set of teachers in a school. Under what conditions is the function one-to-one if it assigns to a teacher his or her

a) Office.
b) Assigned bus to chaperone in a group of buses taking students on a field trip.
c) Salary.
d) Social security number.

Specify a codomain for each of the functions and specify under what conditions is each of these functions with the codomain you specified onto? Briefly describe your answer by your own. Don't share your answer with others.

5. **4+2**

a) Let R be the relation on the set{1,2,3,4,5}containing the ordered pairs(1,1),(1,2),(1,3),(2,3),(2,4),(3,1), (3,4), (3,5), (4,2), (4,5), (5,1), (5,2), and (5,4). Find if the relation is
a) Reflexive?
c) Symmetric?
d) antisymmetric?
f) Transitive?

Briefly describe the reason with your own words. Make sure that you're not copy from others.

b) Find the power set of A={Ø,{Ø},{}}