



United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid Exam. : Trimester: Fall 2020

Course Code: CSE 2213, Course Title: DISCRETE MATHEMATICS

Total Marks: 20

Duration: 1 hour

Answer all the questions. Figures are in the right-hand margin indicate full marks.

“Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules.”

Question 1.		
a)	<p>(i) Find the sets A and B if $A - B = \{1, 5, 7, 8\}$, $B - A = \{2, 10\}$, and $A \cap B = \{3, 6, 9\}$.</p> <p>(ii) Find out the following:</p> <ul style="list-style-type: none"> If $A = \{1, 2\}$, then $p(p(A \times p(A))) = ?$ Let $S = \{x \in \mathbb{Z}^+ \mid x \text{ is a divisor of } 40 \text{ and } 10 \text{ and less than } 11\}$, find $p(S)$. 	[2.5]
b)	<p>For the following figures (A,B,C,D,E), find out if the following statement is true/false. If false, explain the reason briefly.</p> <p>(a) A has an inverse function (b) B is a one to one function (c) C is one to one and onto function (d) D is a onto function (e) E is a one to one function</p>	[0.5×5=2.5]
Question 2:		
a)	Determine whether $((r \rightarrow s) \wedge (s \rightarrow t)) \rightarrow (r \rightarrow t)$ is a tautology using sequence of logical equivalences law.	[2]
b)	<p>Translate the following English sentences into logical expression using predicate, quantifiers and logical connectives. Domain consists of all people.</p> <p>$P(x)$: x is a student of UIU $Q(x)$: x has learnt C and C++ programming $R(x)$: x is learning Python</p> <p>(i) There is a student in UIU who hasn't learnt C and C++ but is learning Python. (ii) It is not that every student in UIU has learnt C and C++ programming but some UIU students are learning python.</p>	[1.5 x 2 = 3]
Question 3:		
a)	<p>Translate the following sentence into a logical expression.</p> <p>(i) You can be a member of UIU Programming Club only if you are a student of UIU and you have been admitted into the CSE department. (ii) A necessary condition for you have shown up on Interview is you got the job</p>	[1 x 2 = 2]

b)	Determine the truth values of the following propositions. Here, the domain of each variable consists of all real numbers. (i) $\forall x \exists y ((x + 1)^2 = y)$ (ii) $\exists x ((-x+1)^2 = x^2)$ (iii) $\neg \forall x (x^3 > 0)$	[1 x 3 = 3]
Question 4:		
a)	Prove the following by using the principle of mathematical induction, n is a positive integer. $1.2 + 2.3 + 3.4 + \dots + n(n + 1) = n(n + 1)(n + 2)/3$	[3]
b)	Prove by contraposition, If $n^3 - 1$ is even, then n is odd.	[2]