



# United International University (UIU)

Department of Computer Science and Engineering

CSE 225: DIGITAL LOGIC DESIGN, Midterm Spring 2019

Total Marks: 30

Duration: 1 hour 45 Min

## Answer Any 2 Questions from Q1 to Q3

1.	(a) (i) Convert $(310.2)_4$ to octal (ii) Find the binary representations for the BCD number: 0100   1000   0110   0111 (b) Add $(4575)_{10}$ and $(5415)_{10}$ with the help of their BCD representation.	[4]  [2]
2.	a. Express the function in (i) Sum-of-Minterms and (ii) Product-of-Maxterms forms $F(X, Y, Z) = (XY + Z)(Y + XZ)$ b. Find the complement of the expression, $(W' + X)Y' + Z$	[4]  [2]
3.	(a) Given that $AB = 0$ and $A + B = 1$ , use algebraic manipulation to prove that $(A + C).(A' + B).(B + C) = BC$ (b) Reduce the Boolean expression to one literal $(A\bar{B}(C + BD) + \bar{A}\bar{B})C$ . <i>Be</i>	[4]  [2]

## Answer Following 2 Questions (Q4 and Q5)

* 4.	Optimize the following Boolean functions F together with the don't-care conditions in (i) sum-of-products and (ii) product-of-sums form: $F(A, B, C, D) = \prod_M (4, 6, 7, 8, 12, 15), d(A, B, C, D) = \sum_m (2, 3, 5, 10, 11, 14)$	[6]
5.	Optimize the following function using K-map. In your solution, you have to show (i) all prime implicants, (ii) essential prime implicants and (iii) minimized Sum-of-Product form. $F(A, B, C, D) = \sum_m (0, 2, 4, 5, 8, 14, 15), d(A, B, C, D) = \sum_m (7, 10, 13)$	[6]

## You MUST Answer Q7

6.	<p>You have to design a combinatorial circuit that will take a 4 bit binary number as input and produce a single bit as output. Your circuit will be able to detect if the number of 0's in the given input is greater than the number of 1's. Your circuit will produce 1 as output for the former case (number of 0's greater than number of 1's) and else it will produce 0. For example if the input is 0001, it will produce 1 as output and if the input is 0011 or 0111 it will produce 0 as output. <b>You have to find the expression of the output and draw the logic diagram using basic gates.</b></p> <p style="text-align: center;">OR</p> <p>You have to design a combinatorial circuit that will take two 2 bit numbers as input and produce their 3 bit sum as output. For example, if two inputs are 01 and 11 it will produce 100 as output. <b>You have to find expression for all output bits.</b></p>	[6]
----	---	-----