[Any examinee found adopting unfair means including copy from another examinee will be expelled from the trimester/program as per UIU disciplinary rules.]

Answer Any 2 Questions from Q1 to Q3

1.	(a) Convert the number $(A02E.D4)_{16}$ to a base-8 number.	[2]
	(b) Encode the numbers $(246)_{10}$ and $(756)_{10}$ to BCD (Binary Coded Decimal) and perform BCD addition.	[2]
2.	(a) Reduce the Boolean expression to three literals $(x'y' + z)' + z + xy + wz$.	[2]
	(b) Find the complement of the Boolean expression $(A + B' + C)(A'B' + C)(A + B'C')$.	[2]
3.	(a) Convert the Boolean expression into Sum-of-Minterms $X' + X(X + Y')(Y + Z')$	[2]
	(b) Convert the Boolean expression into Product-of-Maxterms $(AB + C)(B + A'B'C)$	[2]

Answer Any 1 Question from Q4 to Q5

4.	You have to design a combinatorial circuit that will take a 4-bit binary number as input and determine if the number of '0's in the input is even or odd. The output of the circuit will be
	     i) HIGH or '1' if the number of '0's in input is even
	     ii) LOW or '0' the number of '0's in input is odd
	 For example, if the input is 0100 the output will be 0 and if the input is 1010 the output will be 1. Find a minimized expression for the output function in Sum-of-Products form and draw the circuit diagram using basic gates.
		[4]

5.	Consider a digital system with 4-bit binary number as input. The output bit of the system will be
	     i) HIGH or '1' if the number of 1's = the number of '0's (in input)
	     ii) LOW or '0' if the number of 1's ≠ the number of '0's (in input)
	 For example, if the input is 0101 the output will be 1 and if the input is 0010 the output will be 0. Find a minimized expression for the output of this system in Sum-of-Products form and draw the circuit diagram using basic gates.
		[4]

Answer Any 2 Question from Q6 to Q8

6.	Find the simplified product-of-sum (POS) for the following Boolean function F together with the don't-care conditions d: $F(W, X, Y, Z) = \prod_M (0, 3, 5, 11, 12) + \sum d(1, 8, 9, 14)$	[4]
7.	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. $F(A, B, C, D) = \sum_m (0, 2, 4, 5, 8, 14, 15) + \sum d (7, 10, 13)$	[4]
8.	Optimize the following function using K-map. You have to show the minimized sum-of-product (SOP) form. $F(A, B, C, D) = AC' + B'D + A'CD + ABCD$	[4]