



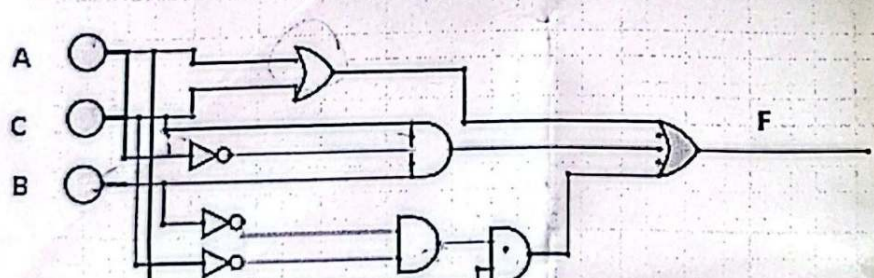
Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid Term Examination, Fall 2025
Course Code: CSE223, Course Title: Digital Logic Design
Level: 2 Term: 2 Batch: 66

Time: 01:30 Hrs

Marks: 25

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. a)	Convert the following number from base 7 to base 9. $(562.3421)_7 = (?)_9$	[4]	
b)	Generate the Boolean expression from the given circuit and <u>simplify</u> it using Boolean laws and <u>draw</u> the circuit diagram of simplified expression using NAND Gates <u>only</u> . 	[6]	CO1
2.	Simplify this Boolean function using K-map with don't care term. $F(A, B, C, D) = \sum(0, 1, 4, 5, 7, 10, 12, 15) + \sum d(2, 8, 9, 13)$	[5]	
3. a)	Draw the 4-bit adder-subtractor circuit and use it to find $A-B$ where $A = (1011)_2$ and $B = (1101)_2$.	[4]	CO2
b)	<u>Explain</u> how a 4×16 decoder can be constructed with two 3×8 decoders and enable pin using <u>block diagrams</u> as components.	[2]	
a)	An automated greenhouse is equipped with four binary sensors: ✓ <u>A</u>: High temperature (1 = High, 0 = Normal) ✓ <u>B</u>: Low soil moisture (1 = Low, 0 = Normal) ✓ <u>C</u>: Low humidity (1 = Low, 0 = Normal) ✓ <u>D</u>: System maintenance mode (1 = Maintenance ON, 0 = Maintenance OFF)	[4]	CO3

The Watering System output (W) should operate according to the following control logic (1=ON, 0=OFF):

1. If the soil moisture is low and the system is not in maintenance mode, the watering system must turn ON.
2. If temperature is high and humidity is low, the watering system must turn ON.
3. If temperature is high and soil moisture is low but humidity is normal, the watering system must turn ON.
4. If the system is in maintenance mode, the watering system must always remain OFF, regardless of other sensor values.
5. If humidity is low while soil moisture is normal and maintenance is OFF, the watering system must turn ON.

Construct the complete truth table, Boolean expression and circuit diagram.