



**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 simplify it using Boolean laws and draw the circuit diagram of simplified expression using NAND Gates only.	[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)	Explain how a 4x16 decoder can be constructed with two 3x8 decoders and enable pin using block diagrams as components.	[2]	
	a)	An automated greenhouse is equipped with four binary sensors: <ul style="list-style-type: none"> <li>• A: High temperature (1 = High, 0 = Normal)</li> <li>• B: Low soil moisture (1 = Low, 0 = Normal)</li> <li>• C: Low humidity (1 = Low, 0 = Normal)</li> <li>• D: System maintenance mode (1 = Maintenance ON, 0 = Maintenance OFF)</li> </ul>	[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.