Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Final Examination, Summer 2026

Course Code: SE 213; Course Title: Digital Electronics & Logic design

Sections & Teachers: A-D(SP), E-H(NIR), I(DAT),J-L(SIK),M(KRY),N(MTE),O(KNA),P(FT)

Time: 2 Hours **Marks: 40**

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)*	$F(I, J, K, L) = \sum (5, 6, 7, 8, 9) + \sum d(10,11,12,13,14,15)$ **Configure** k-map simplification technique using don't-care condition to derive the most simplified version of the above expressions along with circuit.	[Marks-5]	CLO-2 *Level-3*
	b)	**Express** the following function into Product of Sum (POS) standard canonical form and then convert it into its opposite canonical form. $F(A, B, C) = (A + \bar{B}C)(\bar{A}B + \bar{C})$	[Marks-5]	
2.	*a)*	**Build** a full adder logic circuit using decoders.	[Marks-5]	CLO-3 *Level-3*
	b)	An autonomous bus operates on a route from DSC to Dhanmondi with 10 locations, numbered in descending order from Stop 9 to Destination 0. Stop 9 is nearest to DSC, while Destination 0 is the final stop at Dhanmondi. A priority encoder circuit is required to control the bus stop requests. Two passengers simultaneously request to get off at Stops 8 and 5. **Illustrate** the priority encoder by deriving the Boolean expressions and determine which passenger's stop request is served first.	[Marks-5]	
	c)	**Demonstrate** the following Boolean function using an appropriate multiplexer. Show all steps including Implementation table and final design. $F(G, H, I, J) = \sum (0, 3, 5, 6, 8, 9, 14, 15)$	[Marks-5]	
3.	*a)*	**Show** the difference between sequential circuit and combinational circuit.	[Marks-3]	CLO-4 *Level-3*
	b)	T flip flop is a version of the J-K flip flop". **Express the** following statement with an appropriate circuit diagram.	[Marks-5]	
	c)	i) In 4-bit shift register: 1001, **illustrate** how many clock pulses are required to change the content of shift register when all 1's (using by XOR gate for last two bit) ii) **Draw** and describe the block diagram of Serial Input Serial Output (SISO) Register	[Marks-3+4]	