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Daffodil International University

Department of Electrical and Electronic Engineering
Faculty of Engineering
Midterm Examination, Fall-2026

Course Code: 0714-323 | Course Title: Digital Electronics | Teacher's Initial: DAS, BS
Section: A, B, C, D | Level-Term: L2-T3 | Time: 1.5 Hours
Full Marks: 25 | Exam Date: November 01, 2026

[Notes: Answer all the questions. The number on the rightmost side of the question indicates the marks]

Q1. (a) **Represent** your student ID in 84-2-1 code. **Perform** the following subtraction operation using both r's and (r-1)'s complement: $11111)_2 - 1111)_2$ — **CO1 (C3)** [5+3+4]

(b) **Simplify** the following Boolean function to a minimum number of literals using the laws of Boolean algebra.
$F(a, b, c, d) = (b'c' + d)' + d + bc + ad$

(c) Using K-map **find** the simplest form in SOP and POS for the following Boolean function:
$F(w, x, y, z) = \sum(1, 3, 7, 11, 15)$ with the don't care conditions given by
$d(w, x, y, z) = \sum(0, 2, 5)$

Q2. (a) **Implement** the following Boolean function using NAND gates only. — **CO1 (C3)** [3+3]
$F(x, y, z) = x + y'z$.

(b) **Implement** the full subtractor circuit using half subtractor circuits and external gates. — **CO3 (C3)**

Q3. (a) **Define** the following performance characteristics of digital logic families: Propagation Delay, Noise Margin and Figure of Merit. — **CO2 (C2)** [3+4]

(b) **Draw** and properly labeled circuit diagrams of the CMOS AND and CMOS OR gates.