

Midterm Examination, Summer-2026

Course Code: 0714-323

Course Title: Digital Electronics

Question: A, B, C, D, E

Level-Term: L3-T1

Teacher's Initial: I

Marks: 25

Exam Date: June 27, 2026

Time: 1.5 Hours

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

- (a) **Simplify** the following Boolean function to a minimum number of literals using the laws of Boolean algebra.

$$F(A, B, C, D) = (A + B + C' + D)(B' + C' + D)(A' + C + D')$$

- (b) **Design** a combinational circuit that accepts decimal digits represented in 84-2-1 code as input and generates the corresponding 8421 code as output.

- (c) **Implement** the following Boolean function using NOR gates only.

$$F(A, B, C) = \sum (0, 6)$$

- (d) Using K-map **find** the simplest form in SOP and POS for the following Boolean function:

$$F(w, x, y, z) = \sum (3, 4, 13, 15) \text{ with the don't care conditions given by } d(w, x, y, z) = \sum (1, 2, 5, 6, 8, 10, 12, 14)$$

- (a) **Define** noise margin and propagation delay. **Explain** how the fan out capability of DTL can be increased.
- (b) **Draw** neat and properly labeled circuit diagrams of the CMOS NOR and NAND gates.