Digital Electronics

What is the maximum number of terms there can be in a minimal sum of products form of a function of \( n \) boolean variables? [2 marks]

Consider a two-bit multiplier with inputs \( x_1, x_0, y_1, y_0 \) and outputs \( z_3, z_2, z_1, z_0 \) such that

\[
Z = Y \times X
\]

where \( Z, Y, X \) are the positive integers represented by \( z_3z_2z_1z_0, y_1y_0 \) and \( x_1x_0 \) using the obvious representation.

Find a minimal sum of products expression for each of \( z_3, z_2, z_1 \) and \( z_0 \). [10 marks]

Comment on the complexity of building an eight-bit multiplier using a minimal sum of products form. [3 marks]

Describe another way of building an eight-bit multiplier. [5 marks]