

1999 Paper 7 Question 1

VLSI

Describe how a collection of boolean functions expressed as the sum of products of a given set of input signals can be implemented as a programmable logic array in nMOS. Illustrate your example by showing the stick diagram layout for the following pair of functions:

$$F = A.B + B'.C + C'.A'$$

$$G = C.A + A'.B + B'.C'$$

[It is not necessary to expand the full detail of any inverters used in the circuit.]
[12 marks]

Explain how the depletion mode pull-up transistors might be replaced in CMOS by

(a) p-channel transistors used as passive pull-ups; [4 marks]

(b) dynamic logic based on NORA. [4 marks]

[It is not necessary to give the detailed stick diagram for these.]