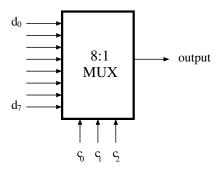# 1996 Paper 2 Question 3

Digital Electronics

(a) A multiplexer is a device that selects one of its inputs as the output. The selection is determined by a set of control signals. For example, in the 8:1 multiplexer shown below, the output will be equal to d_6 when $c_2 = 1$, $c_1 = 1$ and $c_0 = 0$.

Give a circuit which implements this 8:1 multiplexer using only NAND gates.

[10 marks]

(b) Using only 8:1 multiplexers, show how to build a 16:1 multiplexer. [4 marks]

(c) Show how an 8:1 multiplexer and a single inverter can be used to implement any combinational function of four variables. (You may assume the availability of signals for logical 1 and logical 0.) [6 marks]