

2000 Paper 10 Question 9

Digital Electronics

Eight sensors each feed eight bits of information to a circuit which processes the information. It is decided that instead of using 64 signal lines, the data will be multiplexed onto eight data lines with three address lines used to indicate the sensor using the data lines. In fact, the sensors will be continually cycled through in order.

- (a) A three-bit counter is required to cycle through the values for the address lines. Design it. You may assume the availability of a clock signal. [7 marks]
- (b) An 8:1 multiplexer has eight data inputs, three control inputs and an output. The value of the control inputs determines the data input which is selected as the output. Design an 8:1 multiplexer. [5 marks]
- (c) Show how these components would be used to build the required system. [5 marks]
- (d) How would you modify the scheme if there were 256 sensors continually cycled through in order? [3 marks]