

1998 Paper 11 Question 12

Digital Electronics

A controller is required for a traffic light at a four-way intersection. The lights follow the usual UK red, red–amber, green, amber sequence. The lights facing North and South are always identical, as are the lights facing East and West. There are four detectors which indicate if there is traffic approaching the lights from any direction.

- (a) Describe all inputs and outputs of the control circuit. [3 marks]
- (b) Provide a state diagram for the controller. You should indicate state duration (for example, a red–amber state might last 2 seconds). [7 marks]
- (c) Describe how a programmable counter might be used to provide the state duration requirement. [3 marks]
- (d) Give a design for a programmable counter which can be made to count for either four or eight clock ticks. [Hint: consider the inputs and outputs of the counter first.] You need not provide a circuit design. [7 marks]