

1996 Paper 2 Question 2

Digital Electronics

- (a) What is the purpose of a tri-state buffer? Give an example of how it might be used. [5 marks]
- (b) Find the simplest sum-of-products form for the function f with the don't care condition g , where

$$f = a(b\bar{c} + bc + \bar{b}\bar{c}d) + b\bar{d}(\bar{c} + a)$$

$$g = a\bar{b}(cd + \bar{c}\bar{d}) + \bar{a}\bar{c}d$$

[6 marks]

- (c) A Gray code is a sequence of codes which differ in one bit position at each step. For example 00, 01, 11, 10, 00, ... is a two-bit Gray code. Design a counter made from JK-flipflops to produce a three-bit Gray code. [9 marks]