

2008 Paper 7 Question 16

Specification and Verification II

- (a) Specify a combinational device **MAX** with two 4-bit inputs i_1, i_2 and a 4-bit output o , such that the value output on o is the input that has the greater value when interpreted as a binary number. [2 marks]
- (b) Specify a sequential device **REG**(w) with a 4-bit input i and output o such that on the first cycle (cycle 0) w is output on o and on cycle n ($n > 0$) the value input on the preceding cycle is output. [2 marks]
- (c) Write a specification of a device D_{max} with a 4-bit input i and a 4-bit output o such that the value output on o on the n -th cycle is the maximum value input on i on all cycles up to and including the n -th cycle. [4 marks]
- (d) Devise a circuit built out of **MAX** and **REG** that implements your specification. [4 marks]
- (e) Outline how to prove that your circuit meets your specification. [8 marks]