

2004 Paper 10 Question 9

Computation Theory

- (a) What is Turing's Thesis? [2 marks]
- (b) Explain the action of a Turing machine that is specified by a quintuplet description. [4 marks]
- (c) Define the *configuration* of a Turing machine at step t , and establish equations that specify the configuration of a k -symbol Turing machine at step $(t + 1)$ in terms of the configuration at the previous step t . [6 marks]
- (d) Explain how you would use your equations to simulate a specific Turing machine by a register machine whose program encodes the quintuplet description. To what extent does this support Turing's Thesis? [Explicit program for a register machine is *not* required.] [8 marks]