

2004 Paper 9 Question 16

Topics in Concurrency

- (a) Describe the semantics of the modal μ -calculus. [4 marks]
- (b) Describe without proof the meaning of the following modal μ -calculus assertions:
- (i) $\nu Z. \langle c \rangle Z$; [1 mark]
 - (ii) $\mu Z. \langle c \rangle Z$; [1 mark]
 - (iii) $\nu Z. (A \wedge ([c]F \vee \langle c \rangle Z))$ (here F means false); [2 marks]
 - (iv) $\mu Z. (B \vee (A \wedge \langle c \rangle Z))$; [2 marks]
 - (v) $\nu Z. (B \vee (A \wedge \langle c \rangle Z))$. [2 marks]
- (c) Consider the transition system consisting of two states p, q and two transitions $p \xrightarrow{c} q$ and $q \xrightarrow{c} p$.
- (i) Does p satisfy $\mu Z. ([c]F \vee (\langle c \rangle T \wedge \langle c \rangle Z))$?
 - (ii) Does p satisfy $\nu Z. ([c]F \vee (\langle c \rangle T \wedge \langle c \rangle Z))$?
- (Again, here F means false and T means true.) In this part you should justify your answers carefully. [8 marks]