

## 1996 Paper 10 Question 7

### Operating System Foundations

What is meant by *memory-mapped I/O*? How might devices be protected from uncontrolled access? [3 marks]

Describe how I/O might be programmed with and without interrupts enabled. Discuss the implications of the use of these approaches within an operating system. Discuss how interrupt handling might be supported by hardware. [5 marks]

Why does a cache alleviate the possible performance penalty of using DMA? [3 marks]

Give an example involving interrupt-driven software which illustrates the danger of race conditions. [5 marks]

Outline how semaphore operations can be made atomic. [4 marks]