

## 2003 Paper 7 Question 1

### Comparative Architectures

(a) Compare and contrast each of the following techniques for achieving instruction-level parallelism:

- (i) statically-scheduled super scalar;
- (ii) out-of-order speculative execution;
- (iii) Very Long Instruction Word (VLIW);
- (iv) EPIC (as used by IA-64).

[12 marks]

(b) Discuss hardware multi-threading, and hence the different implementation approaches that have been tried to enable a single CPU core to execute from multiple instruction streams. How can multi-threading be used to improve system performance? What are the pitfalls? [8 marks]