

## COMPUTER SCIENCE TRIPOS Part II – 2016 – Paper 8

### 3 Comparative Architectures (RDM)

- (a) Describe briefly six factors which might influence or constrain the design of a new processor. [6 marks]
- (b) The performance of a superscalar processor is often enhanced with hardware to support the following:
- branch prediction
  - register renaming
  - out-of-order execution
  - the speculative reordering of load instructions
  - strided prefetching
- (i) Sketch an assembly language program that would benefit from the use of all of these techniques when executed on a superscalar processor. Briefly describe how each of the techniques helps to improve the performance of your program. [10 marks]
- (ii) Briefly outline two example programs for which the adoption of the techniques listed would not provide a significant performance improvement. [4 marks]