COMPUTER SCIENCE TRIPOS Part II – 2015 – Paper 8

10 System-on-Chip Design (DJG)

(a) Explain what factors limit the complexity and performance of an SoC at the heart of a portable electronic device. [4 marks]

(b) Compare and contrast the use of hardware and software to implement a compute-intensive algorithm on an SoC, such as data encryption. Include customised processors and co-processors in your analysis. [5 marks]

(c) (i) Define the term *fully-pipelined* with respect to a hardware component.
  [2 marks]

  (ii) Describe and compare three designs for a fixed or floating-point multiplier that vary in performance: one at least should be fully pipelined.
  [6 marks]

  (iii) Define the term *structural hazard* and explain why these can affect system performance. Which of your designs from part(c)(ii) might present such a hazard and why? [3 marks]