Oxford Cambridge and RSA

A LEVEL

COMPUTER SCIENCE

H446/01 Computer Systems

Practice Assessment: The characteristics of contemporary processors, input, output and storage devices

Time allowed: 1 hour

INSTRUCTIONS TO CANDIDATES	INFORMATION TO CANDIDATES
• Write your name, centre number and candidate number in the boxes above. • Use black ink. • Answer all the questions. • Write your answer to each question in the space provided. • Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).	• The total mark for this paper is 40. • The marks for each question are shown in brackets [ ]. • Quality of extended responses will be assessed in questions marked with an asterisk (*). • This document consists of 8 pages.

Name	Centre Number	Candidate Number

GRADE BOUNDARIES

A*	A	B	C	D	E
36-40	32-35	28-31	24-27	20-23	16-19

1. A computer system uses a processor with a 32-bit architecture.

   (a) State what is meant by a 32-bit architecture. [1 mark]

   (b) Explain what effect the bit-length of the architecture has on each of the following:

      i. The maximum amount of addressable memory [2 marks]

      ii. The range of integer values that can be processed in a single operation [2 marks]

   (c) A computer system is upgraded from a 32-bit processor to a 64-bit processor. Explain two benefits this upgrade might provide. [4 marks]

2. The Fetch-Decode-Execute cycle is fundamental to the operation of a processor.

   (a) Describe the purpose of each of the following registers in the Fetch-Decode-Execute cycle:

      i. Program Counter (PC) [1 mark]

      ii. Memory Address Register (MAR) [1 mark]

      iii. Memory Data Register (MDR) [1 mark]

      iv. Current Instruction Register (CIR) [1 mark]

   (b) Describe the stages of the Fetch-Decode-Execute cycle. [4 marks]

   (c) Explain how the concept of pipelining can improve processor performance. [3 marks]

3. Modern processors incorporate various performance enhancement techniques.

   (a) Explain what is meant by the following terms:

      i. Cache memory [2 marks]

      ii. Multi-core processing [2 marks]

   (b) Describe the difference between L1, L2, and L3 cache. [3 marks]

   (c) Explain how cache memory improves processor performance. [2 marks]

4. (a) Differentiate between CISC and RISC processor architectures. [4 marks]

(b) Give one example of a processor family that uses:

i. CISC architecture [1 mark]

ii. RISC architecture [1 mark]

5. (*) A computer manufacturer is designing a new system for graphic design professionals. Discuss the factors that should be considered when selecting input, output, and storage devices for this system. Your answer should include consideration of the specific requirements of graphic design professionals and how these requirements influence hardware choices. [8 marks]