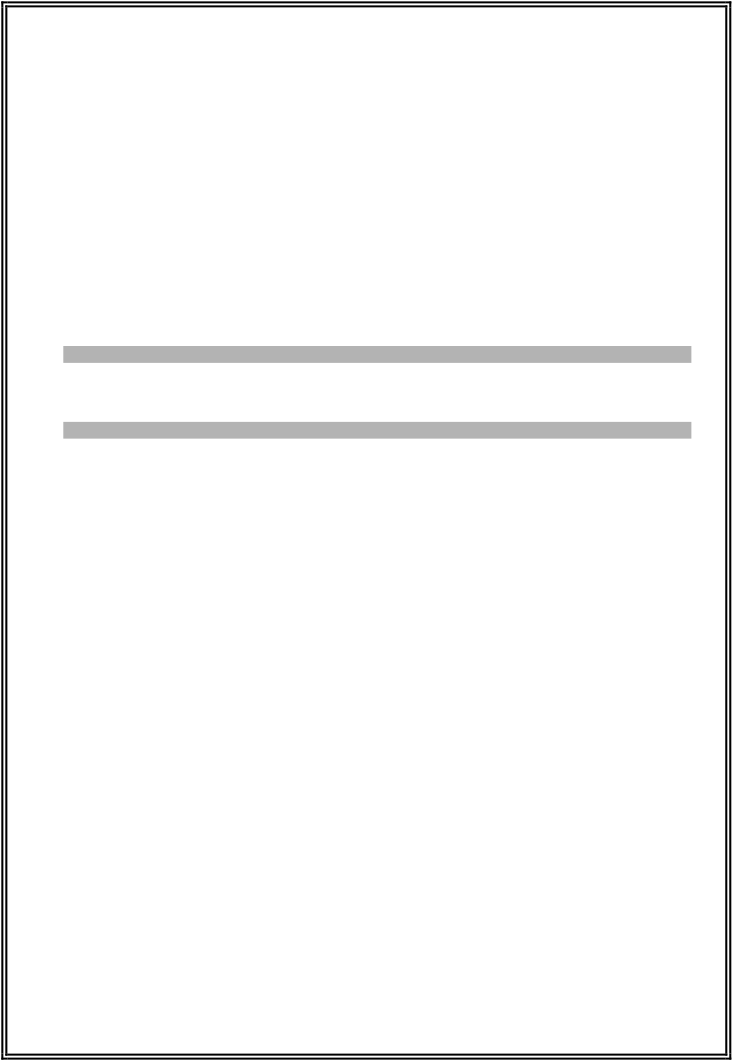
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# **GCE A LEVEL MARKING SCHEME**



**SUMMER 2019**

**A LEVEL (NEW)**

**COMPUTER SCIENCE - COMPONENT 2 A500U20-1**

# **INTRODUCTION**

This marking scheme was used by WJEC for the 2019 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

**GCE A LEVEL COMPUTER SCIENCE - COMPONENT 2 SUMMER 2019 MARK SCHEME**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Q** | **Answer** | **Mark** | **AO1** | **AO2** | **AO3** | **Total** |
| 1. (a)  (b) | **1 mark for each point up to a maximum of two:**   * The program counter value is used to calculate the RAM address of the next program instruction. The address is transferred to the MAR. * The address is then sent out along the address bus.   The program instruction returns along the data bus (and is stored in the CIR).   * The program counter is updated.   **1 mark** **for each point up to a maximum of 3:**   * The program command is accessed in the CIR. * The data to be saved is transferred from general purpose register R to the MDR. * The address 02B6 where the data is to be saved is transferred to the MAR. * The address is then sent out on the address bus. * The data value is sent out along the data bus. * The program counter is updated. **(not given if stated in (a))** | 1  1 1  1 1  1  1 1  1 |  | 2b  2b |  | 2  3 |

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| **Q** | **Answer** | **Mark** | **AO1** | **AO2** | **AO3** | **Total** |
| 2. (a) | 1. The closest representation of 139.6 possible is: 1000 1011 . 100111   10  In floating point format, this is:  0.1000 1011 1 x 28  Using the specified format,  mantissa 0.1000 1011 1  exponent 001000 (1 mark) (1 mark)  **or**  0100 0101 11 0010 00  Note: either format is acceptable.   1. The floating point number 0100 0101 11 0010 00 has a value of 139.510   Absolute error = original value – rounded value   * 139.6 – 139.5 = 0.1   Relative error = absolute error / original value X 100%   * 0.1   × 100% = 0.07%  139.6 | 1 1  1  1 1 1 |  | 2a 2a  2a  2a 2a 2a |  | 6 |
| (b) | 1. Using two's complement with 8 bits: 37 = 0010 0101   10  1910 = 0001 0011 -1910 = 1110 1101  Adding:  0010 0101 1110 1101 0001 0010   1. Left shift by 2 places, giving: 0100 1000 | 1 1  1 1 |  | 2a 2a  2a 2a |  | 4 |

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| **Q** | **Answer** | **Mark** | **AO1** | **AO2** | **AO3** | **Total** |
| 3. | **1 mark for a valid example of batch processing**  **1 mark for a valid example of real time transaction processing**  **1 mark** for each point, up to a **maximum of 4 marks**: **Group RTTP and Batch together**   * Real time transaction processing involves direct updating of the master file immediately an event occurs. * Real time processing can avoid double booking (e.g. hotel rooms, theatre seats…) * Real time gives an accurate current view of the data (e.g. shop stock control, so staff are immediately aware if running low on stock) * Real time systems involve more complex algorithms   – e.g. to reserve seats temporarily whilst the customer enters payment details, but free the seats again if payment not made.   * Batch processing uses a transaction file to record events, then the master file is updated at the end of each period (day/week…) * Batch processing is a simpler/faster system to operate. Transactions can simply be stored in the order received, with all processing carried out later. * Batch processing can be carried out automatically at times when the computer system is not otherwise in   use (e.g. at night). | 6 | 1a |  |  | 6 |

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| --- | --- | --- | --- | --- | --- | --- |
| **Q** | **Answer** | **Mark** | **AO1** | **AO2** | **AO3** | **Total** |
| 4. | **3 marks per network component**  **Switch**  **1 mark** for each point, up to a maximum of **3 marks**:   * A **switch** is used to connect computers in a local area network. * The switch is programmed / maintains a table with the IP addresses/machine addresses of connected devices, so can send data to the required device. * When a packet of data is received by the switch, it is checked to determine the destination address.   **Router**  **1 mark** for each point, up to a maximum of **3 marks**:   * A **router** is used to forward data packets between networks. * Routers control traffic on wide area networks such as the Internet. * The router determines the destination of a data packet from the IP address in the packet protocol, then selects an appropriate route for onwards transmission. * Routers may hold information about current transmission speeds to adjacent nodes, so that the fastest path for onward transmission can be selected.   **Multiplexor**  **1 mark** for each point, up to a maximum of **3 marks**:   * A **multiplexor** allows multiple messages to be combined, so that they can be sent over a data link simultaneously, then separated again at the end of the link. * **Time division multiplexing** allocates small time slices alternately for data from each of the input message streams. * **Frequency division multiplexing** sends the different messages simultaneously, but using different transmission frequencies. * On a mainframe (multi-user) computer, a multiplexor allows input to the system from different terminals, then routes system output to the correct terminal. * On a wide area network (e.g. Internet), multiplexing may be used to combine messages for transmission over the very fast high-capacity backbone of the network. | 3  3  3 | 1b  1b  1b |  |  | 9 |

|  |  |  |  |  |  |  |
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| **Q** | **Answer** | **Mark** | **AO1** | **AO2** | **AO3** | **Total** |
| 5. | **Indicative Content**  loop: IN input code from key pad  SUB 02A0 subtract required door code  JZE correct jump out of the loop if correct  code entered  JMP loop repeat the loop if code is not  correct  correct: OUT -1 send signal to unlock door  **1 mark** for input of code from key pad (i.e. IN with no parameter)  **1 mark** for: immediately subtracting required code from input value  **1 mark** for: label and jump command for a loop  **1** **mark** for repeating loop if code input is incorrect  **1 mark** for ending loop if input code is correct  **1 mark** for output value of -1 | 1 1  1 1 1 1 |  |  | 3b | 6 |
| 6. (a)  (b) | 1 mark for a valid use of robotics, and 1 mark for a corresponding example from manufacturing:  **Indicative content:**   * Accurate assembly, e.g. circuit boards. * Carrying out unhealthy or dangerous activities, e.g. car body welding or spray painting. * Repetitive operations, e.g. packing food items in boxes. * Warehouse functions, e.g. collecting selected items from shelves.   1 mark for each valid point, up to 2 marks. |

**This document was truncated here because it was created in the Evaluation Mode.**