GCE AS MARKING SCHEME

SUMMER 2022

**AS
COMPUTER SCIENCE - UNIT 1
2500U10-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2022 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 AS COMPUTER SCIENCE

SUMMER 2022 MARK SCHEME

Q	Answer	Marks	AO1	AO2	AO3	Tot
1.	One mark for each of the following Fetch: • The address of the next instruction is copied from RAM into the register (PC to the MAR) • The instruction is copied to the MDR • The PC is incremented so that it holds the address of the next instruction Decode: • The MDR is copied into the Current Instruction Register (CIR) • The instruction (opcode) is decoded • The operand (if required) is also decoded (or fetched from RAM) Execute • The instruction is carried out. • Each stage is designed to happen concurrently to maximise resources use (clock ticks and memory)	4	1.1b			4

Q	Answer	Marks	AO1	AO2	AO3	Tot
2. (a)	One mark for each of the following up to a maximum of four. Award a maximum of two marks for benefits and two for drawbacks. • Microphone • Voice driven interfaces, also called voice recognition, can be used to issue commands to a computer system and enter data into it. • Voice-driven interface is a popular interface as it is natural for people to communicate in this way. • Speech input is much faster than keyboard input • No need to learn to type • Less danger of RSI • Reduces typing mistakes such as spelling/hitting wrong key • Keyboard takes up room on the desk • Users with a disability that prevents typing can use speech input • Hands-free advantages – can multitask • Users find talking more natural than typing. However • Background noise interferes with speech recognition • User when they have a speech impediment, sore throat, cold or a strong accent will not be understood • Users with a disability that prevents speech would need to find a different method for input • Difficult to keep data input private as people can hear what you are saying • Words that sound the same, such as 'too' and 'two' may not be recognised	4	1.1b			4

Q	Answer	Marks	AO1	AO2	AO3	Tot
(b)	One mark for each of the following up to a maximum of four. Award a maximum of two marks for benefits and two for drawbacks.: • Touch screen • Most operating systems now use touch screens, normally capacitive touch, as the key form of input. • Capacitive touch screens work on the principle that the human body is an electronic conductor. When you press on a capacitive screen it distorts the electromagnetic field of the screen which is then measured as a change in capacitance. This is then translated into x and y coordinates for the device. • Touch screens allow for the use of gestures, such as a swipe, to perform actions. These gestures are intuitive to the user, such as pinching to make something smaller. • Very intuitive • Easier to use as the user simply touches what is seen on the display • No keyboard or mouse is required • Touching a visual display of choices requires little thinking and is a form of direct manipulation that is easy to learn • Easier hand-eye coordination than mice or keyboards However • Screen can be easily damaged/scratched • Dirty screens are difficult to read • Users must be within arm's reach of the display • It is difficult to select small items • User's hand may obscure the screen • Screens need to be installed at a lower position and tilted to reduce arm fatigue • Some reduction in image brightness may occur.	4	1.1b			4

Q	Answer	Marks	AO1	AO2	AO3	Tot
3. (a)	One mark for each of the following up to a maximum of two: • Multiplexing is where several independent data sources are combined • to be sent along a single route to a specific destination • discussion of relative speed	1 1 1	1.1b 1.1b 1.1b			2
(b)	One mark for each of the following: • Source address allows tracing of sender • Destination address allows packet to be routed to destination • Re-assembly information / packet number allows packets to be assembled in correct order • Tracking information allows route taken to be traced • The data itself required as packet can contain meaningful data • Checksum allows checking of data for errors No credit awarded for a list	6	1.1b			6
4. (a)	Number of bits that can be processed **as a single unit** by the processor.	1	1.1b			1
(b)	Convert AE_{16} into binary: 10101110_2 Convert $1B_{16}$ into binary: 00011011_2 Binary addition: 10101110_2 00011011_2 **11001001_2** *01111100* Convert 11001001_2 into denary: 201_{10}	1 1 1 (answer) 1 (carry) 1		2.1a 2.1a 2.1a 2.1a 2.1a		5
(c)	Sign/magnitude • 10100111_2 Twos complement • 11011001_2	1 1		2.1a 2.1a		2

Q	Answer	Marks	AO1	AO2	AO3	Tot
(d) (i)	Mantissa = 0.90625, Exponent = 2 accept 2^2 Answer = 3.625_{10}	1 1 1		2.1a 2.1a 2.1a		3
(ii)	Mantissa = `0.1111111` **or** `0.9921875`$_{10}$ Exponent = `011` **or** 3_{10} Answer = 7.9375_{10}	1 1 1		2.1b 2.1b 2.1a		3
(e)	**Original** • `111.10110`$_2$ **or** 7.6875_{10} **Truncation** • `111.10110`$_2$ = `111.10`$_2$ = 7.5_{10} • Error = `0.00110`$_2$ **or** 0.1875_{10} **Rounding** • `111.10110`$_2$ = `111.11`$_2$ = 7.75_{10} • Error = `0.00010`$_2$ **or** 0.0625_{10} Accept answers in either binary or denary Rounding is more accurate.	 1 1 1 1 1		 2.1a 2.1a 2.1a 2.1a 2.1b		5

Q	Answer	Marks	AO1	AO2	AO3	Tot
5.	One mark for each of the following up to a maximum of six marks. • Fixed length record has same number of bytes in each record and same number of fields, • whereas variable length record has different number of bytes in each record or different number of fields • Fixed length records are easier to program as it can be calculated know how much space will be required • whereas variable length record makes it difficult to calculate how much space will be required • Fixed length records are quicker to process (read/write) by computer as start and end locations are known • whereas variable length records are slower to process (read/write) by computer as start and end locations have to be calculated at read/write time • Fixed length record wastes storage space as fields have blank storage space • whereas variable length record saves storage space as no blank storage space • Fixed length record will truncate long fields • whereas variable length record avoids truncation as each field can extend to accommodate any number of characters	6	1.1b			6

Q	Answer	Marks	AO1	AO2	AO3	Tot
6. (a)	Award one mark for each of the following up to a maximum of six marks: • Different user groups can have different views / access rights / privileges o Improves security o Certain fields / tables can be hidden o Certain fields / tables can be visible, but read-only, which prevents unauthorised editing o Users can be restricted from running queries o Users can be restricted from altering the database structure o Users can be restricted from deleting records • A pre-defined complicated query can be made available for users to view • Performance – views can be setup with performance in mind and then re-used by other developers • A certain view can simplify access to data spread over multiple tables Award additional credit for examples that illustrate the points above.	6	1.1b			6
(b)	Files can be archived when they are no longer in use but may be needed at some point in the future.	1	1.1b			1

Q	Answer	Marks	AO1	AO2	AO3	Tot
7.	**Indicative content**					8

```
1   declare loginDetails(3,5) as string
2   set username as string
3   set password as string
4   set flag as Boolean
5
6   set flag = FALSE
7
8   output "Please enter username"
9   input username
10  output "Please enter password"
11  input password
12
13  for i = 0 to 4
14     if username = loginDetails(0,i) AND
       password = loginDetails(1,i) then
15           output "You have successfully
       logged in ", loginDetails(2,i)
16           set flag = TRUE
17     else
18     if username = loginDetails(0,i) AND
       password <> loginDetails(1,i) then
19           output "Incorrect password"
20     end if
21
22  next i
23
24  if flag = FALSE then
25     output "User not found"
26  end if
```

Q	Answer	Marks	AO1	AO2	AO3	Tot
	One mark for each of the following: • Initialise variables • Input username and password • Loop structure + increment • Username comparison • Password comparison • Output successful message with full name • Output error message for incorrect password • Output error message for user not found	8			3.1b	

Q	Answer	Marks	AO1	AO2	AO3	Tot
8.	One mark for each of the following up to a maximum of 4: • Batch processing • Time sheets or hours worked are collected • Data are collected over a period of time, weekly or monthly • The batch is processed at the end of that period • Process is carried out with no user interaction • Batch processing may avoid using computer resources at times when demand is high /off-peak • Errors are stored in a file for later use and not dealt with as they occur	4		2.1b		4
9.	$(A + B).(A + C) + \overline{B}.B$ $(A + B).(A + C)$ $A.A + A.C + B.A + B.C$ $A + A.C + B.A + B.C$ $A(1 + C + B) + B.C$ $A + B.C$	1 1 1 1 1		2.1a 2.1a 2.1a 2.1a 2.1a		5
10. (a) (i)	One mark for each of the following: • Identifying C as the constant • A constant is a value that cannot be altered by the program during normal execution	1 1	1.1b	2.1b		2
(ii)	One mark for each of the following: • Identifying A or B • A variable is an identifier with a value that can be changed during normal execution.	1 1	1.1b	2.1b		2
(b)	Self-documenting identifiers are meaningful which allows other programmers to follow the code more easily. Suggestions A → r or Radius B → A or Area C → Pi	1 3	1.1b	2.1b		4

Q	Answer	Marks	AO1	AO2	AO3	Tot
11. (a)	One mark for each of the following up to a maximum of four: • Procedural languages are used in traditional programming based on algorithms or a logical step-by-step process for solving a problem • They obey (ordered) instructions • They carry out actions / calculations etc. • A procedural programming language provides the programmer a way to define precisely each step when performing a task • Allows tight control over the underlying operation of the hardware • Used in (large complicated) programs where similar operations may be carried out at varying stages of the program execution.	4	1.1b			4
(b)	One mark for each of the following up to a maximum of four: • Mark-up languages add commands, or mark-up, to a text document to offer meaning to the text. • The commands give instructions to the program reading the file on how to interpret and display the text. • One of the most common mark-up languages is HTML. • The commands in HTML are called tags, are surrounded by chevrons. • Commands are opened, for example , so that any text that follows will have the command applied to it. • Commands are then ended using a forward slash inside the tag, for example . • XML (eXtensible Mark-up Language) is another mark-up language that is commonly used in web applications. • XML is used for structuring and marking-up data for storage rather than information for display. • The developer is free to create their own tags and specify their own meaning to them. • Mark-up languages are commonly combined with other languages, such as JavaScript with HTML.	4	1.1b			4

Q	Answer	Marks	AO1	AO2	AO3	Tot
12.	Malicious damage is when data is amended or deleted on purpose	1	1.1b			4
	Accidental damage is when data is amended or deleted without malicious intention.	1	1.1b			
	Examples Malicious damage: • Hacker could access and **change data / plant virus** (must be qualified) • Disgruntled bank employees could damage data to hurt bank • Customer change data about themselves or other customers	1	1.1b			
	Accidental damage: • Customer deleting information such as statements • Bank employees deleting information by accident • Computer server crash / system failure • Computer damage due to fire / flood • Money lost / gained during electronic transfer	1	1.1b			

Q	Answer	Marks	AO1	AO2	AO3	Tot
13.	**Indicative content** • Using a knowledge-based system, a user can interrogate a vast knowledge base to find a solution. • The user enters the information he or she already has, and the knowledge-based system infers an answer. • If the system cannot reach a conclusion, it requests more information. This process is continued until either the system has a high degree of confidence that it knows what the solution is, or it is sure that, having exhausted every line of inquiry, it does not know the solution. Advantages: • The computer can store far more information than a human. It can draw on a wide variety of sources such as stored knowledge from books case studies to help in diagnosis and advice. • The computer does not 'forget' or make mistakes. • Data can be kept up-to-date. • The expert system is always available 24 hours a day and will never 'retire'. • The system can be used at a distance over a network. So rural areas or even poorer third world countries have access to experts. • Provides accurate predictions with probabilities of all possible problems with more accurate advice. • Some people prefer the privacy of talking to a computer. Disadvantages: • Over reliance upon computers • Some employees could be de-skilled by over dependence upon computer advice. • Fewer medical staff could be needed • Lacks the 'human touch'! – lack of personal contact • Dependent upon the correct information being given. If data or rules wrong the wrong advice could be given. • No human available if you do not know what to do.	11	1.1b			11

Band	AO1.1b Max 11 marks
3	**9-11 marks** The candidate has: • written an extended response that has a sustained line of reasoning which is coherent, relevant, and logically structured • shown clear understanding of the requirements of the question and a clear knowledge of the indicative content. Clear knowledge is defined as a response that provides nine to eleven relevant detailed points, which relate to an extensive amount of the indicative content • addressed the question appropriately with minimal repetition and no irrelevant material • has presented a balanced discussion and justified their answer with examples • used appropriate technical terminology referring to the indicative content confidently and accurately.
2	**4-8 marks** The candidate has: • written a response that has an adequate line of reasoning with elements of coherence, relevance, and logical structure • shown adequate understanding of the requirements of the question and a satisfactory knowledge as specified in the indicative content. Satisfactory knowledge is defined as a response that provides four to eight points as signalled in the indicative content • has presented a discussion with limited examples • used appropriate technical terminology referring to the indicative content.
1	**1-3 marks** The candidate has: • written a response that that lacks sufficient reasoning and structure • produced a discussion which is not well developed • attempted to address the question but has demonstrated superficial knowledge of the topics specified in the indicative content. Superficial knowledge is defined as a response that provides one to three points as signalled in the indicative content • used limited technical terminology referring to the indicative content.
0	**0 marks** • Response not credit worthy or not attempted.

Total	100	60	32	8	100