GCE MARKING SCHEME

COMPUTING
AS/Advanced

JANUARY 2014

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014. examination in GCE COMPUTING. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were 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 conferences was to ensure that the marking schemes were 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' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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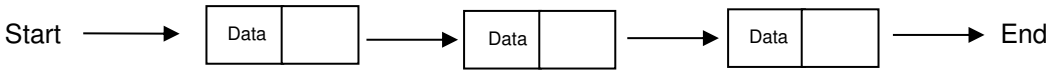
GCE COMPUTING - UNIT CG3

Mark Scheme - January 2014

Question	Answer	Mark
01	A web log is a set of entries / diary on the world wide web which is accessible to any web user. The student could add items including photos, videos etc. to keep their friends up-to-date with their activities / could keep in touch with other members of the charity etc.	1 1
02	Downloading music: refers to accessing music file via the internet either freely (legally or illegally) or from a web-site where payment is needed (for local storage) Difficulty: download speeds may be very low / access may be unreliable / excessive data charges On-line banking: refers to accessing balance details, transferring money etc in connection with your own account via a secure web-site Difficulty: there may be concerns over security with data transfers between countries or within the country	1 1 1 1
03	**Any 2 of:** • Should be easily navigable / should have links to other pages etc • All links should be correct • The page should be as accessible as possible for users with visual impairment, etc • It should make sensible/imaginative use of colour, graphics, fonts, etc • Should comply with established web standards • Should load quickly	2x1
04	Circuit switching: Dedicated path is set up between the sender and receiver Packet switching: • (Data split into packets) each packet may be transmitted by different routes • Packets may arrive out of order and are re-assembled **Any 2 of (both needed for the one mark):** • the actual data • the order number of the packet / reassembly data • error checking data **[Not source and destination addresses]**	1 1 1 1
05	**Any 3 of:** • Speeds up text input / faster than typing • Can be used by someone who is unable to type / not a skilled typist / disabled • May help to avoid RSI • Allows user to simultaneously do some other task with hands etc Ambiguity problems: • Different words may sound the same (e.g. too / to / two) • Command words may be taken as input words (or vice versa) (e.g. "start sentence")	3x1 1 1
06	The computer prompts for input into specific fields on a screen dialogue box. Many inputs may be via combo boxes, radio buttons, etc, so only certain entries are allowed.	1 1

07	Data structures: any <u>two</u> of the following for **<u>ONE</u>** mark: • queue • stack • (binary) tree • record • array (NOT linked list)  **Marking**: Accept single boxes with arrows rather than twin boxes • pointers (including start and end - accept other indications of start and end) • data	1 1 1
08	**AND** An example could be: MASK `10000000` VALUE `11001011` MASK **AND** VALUE `10000000` Explanation: when **AND**ed with another number, this (example) mask determines whether the left hand bit of the number is 1 or 0	1 1 1
09	The physical location of the record is calculated from the data in the key field This calculation is carried out by a hashing algorithm A data collision occurs when two data items are hashed to the same location In this case there needs to be an overflow area where the latest data is stored, usually in a linear structure When there are many items in the overflow area, access may become slow, in which case a new/updated hashing algorithm is required and a larger file may/will be needed (both points needed for this mark) ***An example of an extended answer worth six marks is:*** A random access file is one where the physical location of the record is calculated (using a hashing algorithm) from the data in the key field. Sometimes, a data collision occurs (i.e. two data items are hashed to the same location.) In these circumstances, there needs to be an overflow area where the latest data is stored. When the file begins to get quite full, there may be many items in the overflow area and access may become slow. A solution to this problem is to create a new hashing algorithm and a larger file may be needed.	1 1 1 1 1 1
10	Item is compared with (sorted) list to find correct position Items in the sorted list are moved up/down to enable new items to be added in the correct place	1 1
11	Rounding: number is approximated to <u>nearest</u> whole number/tenth/hundredth, etc Truncating: number is approximated to whole number/tenth/hundredth, etc, <u>nearer zero</u> (accept *lower*)	1 1

12	Either of: a more serious problem might arise where: • successive use in further calculations may seriously increase inaccuracy • a test for equality might fail if a minor difference is caused by rounding (**Not** the idea of "cause an error" or "inaccurate" alone)	1
13	If in point form: any 6 of **(but must have both of first two*** to gain six)** • *** An expert system is based on facts and rules / inference engine • *** employing a large database (*Knowledge base*: accepted not expected) • might help them to diagnose / treat unusual conditions • might save doctor's time • might reduce time spent in training doctors • up to date information • might cause the doctor to be held in lower esteem (de-skilling: accepted not expected) • doctor may become over reliant on system ***An example of an extended answer worth six marks is:*** An expert system is a software system with a large database (often called a knowledge base) and a built-in set of facts and rules which enable it to appear to be an expert in a certain area similar to a human expert, by analysing and solving complex problems. An ES might be used by the doctor to diagnose unusual or complex conditions from information gathered from the patient. The ES might reduce the number of years spent training to be a doctor. It might save the doctor's time by covering simple conditions first and allowing the doctor to concentrate on more difficult medical situations. Doctors might also welcome the ES if it enables unusual medical conditions to be diagnosed rapidly and reliably. The doctor / medical profession might be concerned that ES might lead to the loss of status / esteem or deskilling of the profession.	6
14	If answered in point form, any five from: • Biometric data is unique to a person • Biometric data is very difficult to copy, steal or imitate (unlike PINs, signatures, etc) • It is not possible to "forget" as it would be with access cards, PINs, etc • Some people might see this use of biometrics as an infringement of privacy / modesty, etc, (personal liberty) • People might also be concerned about the uses the data might be put to • People might be concerned about physical damage (e.g. eye damage from repeated flash photography) • Will not work if the original data capture was flawed (e.g. if criminals manage to have their data recorded and fraudulently become authorised) ***An example of an extended answer worth five marks is:*** Biometric systems usually work by biometric data being recorded for authorised persons, for instance the staff of a bank. When someone requires access (for instance physical entry to the bank) a comparison is made between the stored biometric data and that of the presenting person - access is only allowed if they match. This approach has the benefit that biometric data is very difficult to copy, steal or imitate (unlike PINs, door keys, signatures, etc) Also it is not possible to "forget" as it would be with access cards, PINs, etc. However, some people might see this use of biometrics as an infringement of their privacy or modesty and might be concerned about physical damage (e.g. eye damage from flash repeated photography. People might also be concerned about the uses the data might be put to.	5x1

15	Data mining: the analysis of a large amount of data (in a data warehouse) to provide new information / find patterns/trends in the data Supermarket: Any 2 of: • could attract customers to make additional purchases via targeted special offers, etc • could reward customers for purchases made • could learn about individual customer choice, shopping times, etc • could sell info on to third parties ***An example of an extended answer worth four marks is:*** Data mining is the analysis of a large amount of data in a data warehouse to provide new information or to find new patterns in the existing data. A supermarket could use the intelligence derived from data mining on data extracted from loyalty card data to increase its profits by attracting customers to make additional purchases via targeted special offers, etc and to reward customers for previous purchases.	1 1 2x1
16	Buffer A buffer is filled at one end and emptied at the other end / while one buffer is being emptied, another can be filled buffering avoids fast device waiting for the data transfer Double buffering is quicker than single buffering ***An example of an extended answer worth four marks is:*** A buffer is an area of computer memory where data is held while transferring it to or from a (slower) peripheral. With double buffering, while one buffer is being emptied, another can be filled. This avoids waiting for the data transfer.	1 1 1 1
17	Interrupt: is a signal generated by a device/software which may cause a break in execution Afterwards, execution of the original routine may continue or another high priority interrupt may be serviced. (both points needed) Situations giving rise to interrupts: **any two of** (Must indicate S/W or H/W): • May arise from a run time error (S/W) • May arise from input/output request (S/W) • May arise from a user request (S/W) • May arise from a software fault (S/W) • May arise from a peripheral e.g. keyboard key pressed (H/W) • May arise from a peripheral e.g. printer run out of paper (H/W) • May arise from e.g. a timer pulse (H/W) • May arise from a hardware fault (H/W) ***An example of an extended answer worth four marks is:*** An interrupt is a signal generated by a device or software which may cause a break in the execution of the current routine. Afterwards, execution of the original routine may continue (or another high priority interrupt may be serviced.) Situations giving rise to interrupts include: an input/output request (software) and a timer pulse (hardware.)	1 1 2x1
18	A flat file is database held as a table and stored in a single file, whereas a relational database normally contains a number of linked tables.	1
19	Any two of: The DBMS allows access via passwords. The DBMS allows certain users access to certain records or fields only. The DBMS may allow read and/or write access only.	2x1
20	Either of: An index is used to: • improve (read) access times to records / allow direct access to data in the database (not	1

	"quick" alone) • sort the records (for viewing/output)	
21	00001011 -> **01011000** Any 1 of: • Multiplies the original number by 8 • Multiplies by 2 three times • Multiplies by 1000_2 – in which case subscript must be shown	1 1
22	An arithmetic shift maintains/deals with the sign bit; a logical shift does not. (Example is acceptable if clear)	1
23	The table contains repeating groups/entities (English, Mathematics, Computing, etc)	1
24	FILM (FilmID, FilmName, Genre, ReleaseYear) COPY (CopyID, FilmID, PurchaseDate) MEMBER (MemberID, MemberName, MemberAddress) LOAN (LoanID, MemberID, RequestDate, CopyID) **Marking:** Four suitable named tables Each of four table with suitable PK shown as such (**1 mark if 2 or 3 PKs**) Each FK shown as such Remove only 1 for any number of incorrect fields / FKs) Ignore additional irrelevant fields	 1 2 3x1
25	BNF is used to describe (unambiguously) the syntax / grammar / rules of a programming / computer language. Natural languages such as English or Welsh are normally ambiguous/imprecise.	1 1
26	<digit> ::= 0|1|2| ... |9 <signornull> ::= +|-|null) <point> ::= .) <digits> ::= <digit>|digit><digits> <decimalnum> ::= <signornull><digits><point><digit><digit><digit><digit> **Marking:** One mark for attempted recursion even if incorrect: - same item Left and Right + other item(s) on Right are needed Can't get 4 unless completely correct Notation error max one mark lost	1 1 1 1

27	One solution is shown. Other correct solutions will receive full credit.
	
	Marking
	input Digit1, input Digit2, input Digit3, input Digit4, input Digit5 — Input five digits
	while (Digit1>0 **AND** Digit2>0 **AND** Digit3>0 **AND** Digit4>0 **AND** Digit5>0) do — Loop until data terminates
	set CheckNum = Digit1*5 + Digit2*6 + Digit3*7 + Digit4*8 + Digit5*9 — First calc Checknum
	while CheckNum >99 do
	set CheckNum = CheckNum -100 — Removal of 100s
	endwhile
	output Digit1, Digit2, Digit3, Digit4, Digit5, CheckNum — Output all
	input Digit1, input Digit2, input Digit3, input Digit4, input Digit5
	endwhile
		1
		1
		1
		1
		1

28	Any 1 of: • If programmer A modifies current version, and programmer B modifies an earlier version, neither new version will contain both modifications • Any amendments must be made to the most recent versions	1
29	Procedural languages are concerned with: any one of: • carrying out actions / calculations, etc • obeying (ordered) set of instructions Non-procedural languages are to do with facts / rules / making queries **Marking:** Two of the above are needed for the mark	1 1
30	A link loader is a software tool which combines already compiled modules/subprograms into the executable program. Example of error - **any one of:** • link loader cannot find a compiled module/subprogram / it doesn't exist • the number or type of parameters provided is wrong	1 1

31	**Compilation:** • During Lexical Analysis, input stream is broken into tokens • During Lexical Analysis, comments and unneeded spaces are removed • During Lexical Analysis, error messages are generated if appropriate • During Syntax Analysis, symbol table / dictionary is produced (could be in Lexical Analysis instead) • During Syntax Analysis, tokens are checked for fit to the grammar, using BNF-type rules • During Syntax Analysis, if not the case, error message(s) are produced • During Semantic Analysis, checks that all variables are declared (and used) • During Semantic Analysis, checks that e.g. real values are not being assigned to integers • During Semantic Analysis, checks that operation is legal for type/no mixed mode arithmetic • During Semantic Analysis, Reverse Polish logic will be used (Accepted not expected) • During Code Generation, machine code is generated (NOT twice for compiler) • During Code Generation, code optimisation may be employed (accepted not expected) [**Note**: If simply named 3 or 4 of: Lexical Analysis / Syntax Analysis / Semantic Analysis / Code Generation: two marks If simply named 2 or 4 of: Lexical Analysis / Syntax Analysis / Semantic Analysis / Code Generation: one mark] **Debugger:** • Program trace/Step-through: enables the programmer to see the progress through the program - which statements/procedures are being executed at any time • Break point: allows the programmer temporarily to halt execution in order to ascertain the value of variables at that point (or to step through the program from that point) • Variable watch: lists the value of a variable at specific points during the execution • Store dump: lists the entire contents of memory at a specific point • Error diagnostics: provision of messages relating to errors in the program Accepted not expected: • Post-mortem routines: enables programmer to see the values of variables at the point where the program failed. **Marking**: The description of any of the points could be extended with more detail and/or a good example to gain extra marks. **Maximum of 8 marks if only 1 of the 2 sections attempted.** 9-11 Candidates give a clear, coherent answer fully and accurately describing and explaining both areas. They use appropriate terminology and accurate spelling, punctuation and grammar. 5-8 Candidates describe and explain at least one of the two areas, but responses lack clarity. There are a few errors in spelling, punctuation and grammar. 1-4 Candidates simply list a range of points or give a brief explanation of one of the areas. The response lacks clarity and there are significant errors in spelling, punctuation and grammar. 0 No valid response.	11
	Total	100

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk