



Oxford Cambridge and RSA

AS Level Computer Science

H046/01 Computing principles

Sample Question Paper

Date – Morning/Afternoon

Time allowed: 1 hour 15 minutes



Do not use:

- a calculator



First name											
Last name											
Centre number							Candidate number				

INSTRUCTIONS

- Use black ink.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION

- The total mark for this paper is **70**.
- 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 **16** pages.

Answer **all** questions.

- 1 Intensive Care Units in hospitals are for patients in need of round the clock monitoring and support. Computerised systems can be used to monitor patients' vital signs (temperature, heart rate, blood pressure and breathing). They can then alert medical professionals to any significant changes.

These systems usually run on an embedded, real-time, operating system.

- (a) (i) State what is meant by the term *real-time*.

.....
.....[1]

- (ii) Explain why a real-time operating system would be suitable for this purpose.

.....
.....
.....[2]

- (b) (i) Explain two advantages of this monitoring system having its operating system stored in ROM.

.....
.....
.....[2]

- (ii) The monitoring system also has RAM. Describe what happens to the contents of RAM and ROM when power to the monitoring system is removed.

.....
.....
.....[2]

2 InterMovie is a service that allows users to stream movies over the Internet.

(a) When users have played a movie it remains stored in a cache on the user's computer. This means that someone wanting to access the same film in future can stream it from other users rather than directly from the company's servers.

(i) State what this network model is called.

.....[1]

(ii) Explain why the company might have opted for this model.

.....
.....
.....[2]

(b) InterMovie has a relational database of the films it offers. The database has the field *Film Title* which stores the name of a film (e.g. 'Aliens Attack').

(i) Describe why *Film Title* is not a suitable primary key.

.....
.....
.....[2]

(ii) Describe why *Film Title* would make a suitable secondary key.

.....
.....
.....[2]

- 3 The following assembly code in Fig.1 is written for the Little Man Computer instruction set.

```

    INP
    STA  arg1
    INP
    STA  arg2
    LDA  arg1
loop  SUB  arg2
    BRP  loop
    ADD  arg2
    OUT
arg1  DAT
arg2  DAT

```

Fig.1

- (a) State the output when the inputs are 13 followed by 5.

.....[1]

- (b) In the line:

```
loop  SUB  arg2
```

- (i) State what opcode SUB does.

.....[1]

- (ii) Name the register in which the result of this line is stored.

.....[1]

- (c) (i) State what the program in Fig.1 does.

.....[1]

- (ii) Using pseudocode write a program for a procedural language that takes in two inputs and gives the same output as the program in Fig.1.

.....
.....
.....
.....[2]

4

- (a) Convert the denary number 43 into an 8 bit binary number.

.....
.....[1]

- (b) Using binary subtraction, calculate your answer to the following. You must show your working.

$$\begin{array}{r} 01001100 - \\ \underline{00110010} \end{array}$$

.....
.....
.....[2]

- (c) Using two's complement convert the denary number -43 into an 8 bit binary number. You must show your working.

.....
.....
.....[2]

- (d) (i) Using normalised floating point binary representation using 4 bits for the mantissa and 4 for the exponent, represent the denary value 1.75. You must show your working.

.....
.....
.....[2]

- (d) (ii) Using normalised floating point binary representation using 4 bits for the mantissa and 4 for the exponent, represent the denary value **-1.75**. You must show your working.

.....
.....
..... [2]

5 Burger House is a fast food restaurant which wants to encourage healthy eating amongst its younger diners.

(a) (i) Shown below in Fig.2 is the Burger House children’s menu.

Children’s Menu

Burgers

Cheeseburger

Grilled chicken burger (*Healthy Option*)

Side Dishes

French fries

Salad (*Healthy Option*)

Carrot Sticks (*Healthy Option*)

Desserts

Chocolate Brownie

Fruit Salad (*Healthy Option*)

Fig.2

Children receive a free toy when they select a meal (i.e. one burger, one side dish and one dessert) made up of only healthy options.

- Let g be a Boolean value for if a child has chosen a *grilled chicken burger*.
- Let s be a Boolean value for if a child has chosen *salad*.
- Let c be a Boolean value for if a child has chosen *carrot sticks*.
- Let f be a Boolean value for if a child has chosen *fruit salad*.
- Let t be a Boolean value for whether a child receives a toy.

Write an expression using Boolean algebra to determine whether a child receives a toy when they select a meal.

$t =$

[3]

(ii) Burger House wants to add this logic into its' till system.

Complete the code below assuming that g,s,c,f and t are Boolean variables with the same meaning as part (i).

```
t=false
if _____ then
    _____
endif
```

[2]

6 An electronics engineer needs a circuit with the following logic.

$$(A \wedge B) \vee (\neg A \wedge B) \vee (\neg C \wedge \neg D)$$

Complete and use the Karnaugh map below to simplify the expression above.

		AB			
		00	01	11	10
CD	00				
	01				
	11				
	10				

Simplified expression:

.....

.....[4]

(ii) Explain why it is usually the case that JavaScript is interpreted rather than compiled.

.....
.....
.....
.....[2]

(c) At the end of each match players upload their score to a computer. The computer stores the scores in the order they are received in a 2D array called `player`. The array stores the team as an integer (1 for green, 2 for red) and their score. An extract of the array called `player` is shown below. The first entry shows a green team member scored 45 points and the next shows a red team member scored 30 points.

1	45
2	30
2	46
1	31
1	10
1	32
2	2

Once all the players have uploaded their scores the computer adds up the scores for each team.

Using pseudocode write a program for a procedural language that works out and outputs the total score for each team. You may assume that there are always 20 players.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....[6]

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Oxford Cambridge and RSA

...day June 2014 – Morning/Afternoon

AS Level Computer Science

H046/01 Computing principles

SAMPLE MARK SCHEME

Duration:1 hour 15 minutes

MAXIMUM MARK 70

This document consists of 20 pages

MARKING INSTRUCTIONS**PREPARATION FOR MARKING****SCORIS**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal <http://www.rm.com/support/ca>
3. Log-in to scoris and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

TRADITIONAL

Before the Standardisation meeting you must mark at least 10 scripts from several centres. For this preliminary marking you should use **pencil** and follow the **mark scheme**. Bring these **marked scripts** to the meeting.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the scoris 50% and 100% (traditional 50% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the scoris messaging system.

5. Work crossed out:
 - a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
 - b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.
6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.
7. There is a NR (No Response) option. Award NR (No Response)
 - if there is nothing written at all in the answer space
 - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
 - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question.Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).
8. The scoris **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
If you have any questions or comments for your Team Leader, use the phone, the scoris messaging system, or e-mail.
9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. Annotations

Annotation	Meaning

11. Subject-specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper and its rubrics
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

USING THE MARK SCHEME

Please study this Mark Scheme carefully. The Mark Scheme is an integral part of the process that begins with the setting of the question paper and ends with the awarding of grades. Question papers and Mark Schemes are developed in association with each other so that issues of differentiation and positive achievement can be addressed from the very start.

This Mark Scheme is a working document; it is not exhaustive; it does not provide 'correct' answers. The Mark Scheme can only provide 'best guesses' about how the question will work out, and it is subject to revision after we have looked at a wide range of scripts.

The Examiners' Standardisation Meeting will ensure that the Mark Scheme covers the range of candidates' responses to the questions, and that all Examiners understand and apply the Mark Scheme in the same way. The Mark Scheme will be discussed and amended at the meeting, and administrative procedures will be confirmed. Co-ordination scripts will be issued at the meeting to exemplify aspects of candidates' responses and achievements; the co-ordination scripts then become part of this Mark Scheme.

Before the Standardisation Meeting, you should read and mark in pencil a number of scripts, in order to gain an impression of the range of responses and achievement that may be expected.

In your marking, you will encounter valid responses which are not covered by the Mark Scheme: these responses must be credited. You will encounter answers which fall outside the 'target range' of Bands for the paper which you are marking. Please mark these answers according to the marking criteria.

Please read carefully all the scripts in your allocation and make every effort to look positively for achievement throughout the ability range. Always be prepared to use the full range of marks.

LEVELS OF RESPONSE QUESTIONS:

The indicative content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance.

Using 'best-fit', decide first which set of BAND DESCRIPTORS best describes the overall quality of the answer. Once the band is located, adjust the mark concentrating on features of the answer which make it stronger or weaker following the guidelines for refinement.

- **Highest mark:** If clear evidence of all the qualities in the band descriptors is shown, the HIGHEST Mark should be awarded.
- **Lowest mark:** If the answer shows the candidate to be borderline (i.e. they have achieved all the qualities of the bands below and show limited evidence of meeting the criteria of the band in question) the LOWEST mark should be awarded.
- **Middle mark:** This mark should be used for candidates who are secure in the band. They are not 'borderline' but they have only achieved some of the qualities in the band descriptors.

Be prepared to use the full range of marks. Do not reserve (e.g.) high Band 3 marks 'in case' something turns up of a quality you have not yet seen. If an answer gives clear evidence of the qualities described in the band descriptors, reward appropriately.

	AO1	AO2	AO3
High (thorough)	Precision in the use of question terminology. Knowledge shown is consistent and well-developed. Clear appreciation of the question from a range of different perspectives making extensive use of acquired knowledge and understanding.	Knowledge and understanding shown is consistently applied to context enabling a logical and sustained argument to develop. Examples used enhance rather than detract from response.	Concerted effort is made to consider all aspects of a system/problem or weigh up both sides to an argument before forming an overall conclusion. Judgements made are based on appropriate and concise arguments that have been developed in response resulting in them being both supported and realistic.
Middle (reasonable)	Awareness of the meaning of the terms in the question. Knowledge is sound and effectively demonstrated. Demands of question understood although at times opportunities to make use of acquired knowledge and understanding not always taken.	Knowledge and understanding applied to context. Whilst clear evidence that an argument builds and develops through response there are times when opportunities are missed to use an example or relate an aspect of knowledge or understanding to the context provided.	There is a reasonable attempt to reach a conclusion considering aspects of a system/problem or weighing up both sides of an argument. However the impact of the conclusion is often lessened by a lack of supported judgements which accompany it. This inability to build on and develop lines of

			argument as developed in the response can detract from the overall quality of the response.
Low (basic)	Confusion and inability to deconstruct terminology as used in the question. Knowledge partial and superficial. Focus on question narrow and often one-dimensional.	Inability to apply knowledge and understanding in any sustained way to context resulting in tenuous and unsupported statements being made. Examples if used are for the most part irrelevant and unsubstantiated.	Little or no attempt to prioritise or weigh up factors during course of answer. Conclusion is often dislocated from response and any judgements lack substance due in part to the basic level of argument that has been demonstrated throughout response.

Assessment Objective	
AO1	Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms and data representation.
AO1.1	Demonstrate knowledge of the principles and concepts of abstraction, logic, algorithms, data representation or other as appropriate.
AO1.2	Demonstrate understanding of the principles and concepts of abstraction, logic, algorithms, data representation or other as appropriate.
AO2	Apply knowledge and understanding of the principles and concepts of computer science including to analyse problems in computational terms.
AO2.1	Apply knowledge and understanding of the principles and concepts of computer science.
AO2.2	Analyse problems in computational terms.
AO3	Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions.
AO3.1	Design computer systems that solve problems.
AO3.2	Program computer systems that solve problems.
AO3.3	Evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions.

Question			Answer	Marks	Guidance
1	(a)	(i)	The system gives a response within a guaranteed time frame (1).	1 AO1.1 (1)	For 1 mark.
		(ii)	<ul style="list-style-type: none"> If something happens to a patient, a response must be immediate (1). Other types of system may have delays in response (1). This could result in a patient not receiving treatment in time (1). 	2 AO2.1 (2)	Up to 2 marks for a valid explanation that demonstrates application of knowledge and understanding to given context.
	(b)	(i)	<ul style="list-style-type: none"> ROM is quick to start up so the system can be started up quickly (in an emergency) (1). ROM cannot be altered so there is no chance of the OS being accidentally or maliciously changed (on what is a safety critical system) (1). 	2 AO2.1 (2)	Up to 2 marks for valid identification and description that demonstrates application of knowledge and understanding to given context.
		(ii)	<ul style="list-style-type: none"> The contents of RAM are wiped (1) whereas the contents of ROM remain the same (1). 	2 AO1.2 (2)	Up to 2 marks for a valid description.
	(c)*		<p>Mark Band 3–High Level (7-9 marks)</p> <p>The candidate demonstrates a thorough knowledge and understanding of a wide range of ethical benefits and drawbacks; the material is generally accurate and detailed.</p> <p>The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation.</p> <p>The candidate is able to weigh up both sides of the argument which results in a supported and realistic judgment as to whether the update should be made.</p>	9 AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	<p>If only benefits or drawbacks considered – MAX 5 marks.</p> <p>AO1: Knowledge and Understanding</p> <p>The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive:</p> <p>Benefits:</p> <ul style="list-style-type: none"> Medical staff are often overworked and tired and may be liable to make mistake whereas a computer will always act in a deterministic manner. The computer can respond instantly to patients' needs whereas there may be a delay in medical

Question	Answer	Marks	Guidance
	<p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Mark Band 2-Mid Level (4-6 marks) The candidate demonstrates reasonable knowledge and understanding of a range of ethical benefits and drawbacks; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to come to a conclusion showing some recognition of influencing factors that would determine whether an update should be made.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p>Mark Band 1-Low Level (1-3 marks) The candidate demonstrates a basic knowledge of ethical benefits and drawbacks with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion.</p>		<ul style="list-style-type: none"> • staff getting to them. • The round the clock monitoring will become more effective by using a computerised monitoring system as it will allow staff to engage with patients at a specific time providing them support • Staff shortages will not create issues for patients. <p>Drawbacks</p> <ul style="list-style-type: none"> • A computer system may not have the programming to take into account all the relevant factors whereas trained medical staff will. • If there is a bug in the computer's programming and if staff input any values incorrectly then patients could die due to incorrect diagnosis. • As medical knowledge changes the system may need reprogramming which can take longer than retraining staff – also accept the reverse argument that updates can be rolled out quicker than retraining staff. • Patients can have dialogue with medical staff giving information that may not be attainable via sensors. <p>AO2.1: Application The selected knowledge/examples should be directly related to the specific question. The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive:</p> <ul style="list-style-type: none"> • Discussion on how the computerised round the clock monitoring system would impact upon the staff workload of Intensive Care Units. • Discussion on the data protection act and the growth in using computerised monitoring and other

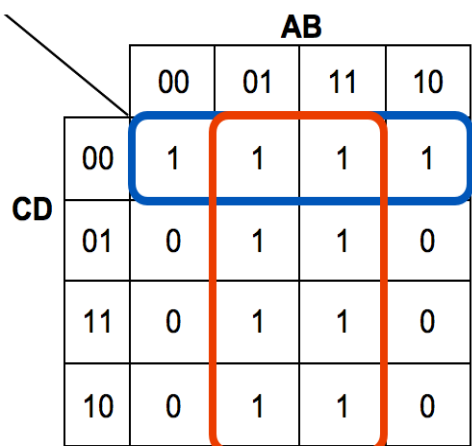
Question			Answer	Marks	Guidance
			<p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks No attempt to answer the question or response is not worthy of credit.</p>		<p>computerised systems.</p> <p>AO3.3: Evaluation The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive:</p> <p>Having considered the different sides to the argument candidates will need to reach a supported judgment based on the evidence included in their response. They will need to evaluate the use of computerised monitoring system and the ethical and legal issues involved around it.</p> <p>e.g.</p> <ul style="list-style-type: none"> • What can be the risks of using computerised monitoring systems for patients, What if the wrong data was entered by staff? • How does computerised monitoring system enable effective care for patients? • Why would you recommend updating computerised monitoring system against the current computerised system already in place?
2	(a)	(i)	<ul style="list-style-type: none"> • Peer to peer (1). 	<p>1 AO1.1 (1)</p>	<p>For 1 mark.</p> <p>Accept hybrid of client-server and peer to peer.</p>
		(ii)	<ul style="list-style-type: none"> • Peer to peer means there isn't a reliance on the company's server (1) and its connection to the Internet (1). • This means it hasn't got to invest in lots of hardware and bandwidth (1) and the system is likely to be more fault tolerant (1). 	<p>2 AO2.1 (2)</p>	<p>Up to 2 marks for a valid explanation that demonstrates application of knowledge and understanding to given context.</p>

Question		Answer	Marks	Guidance
	(b) (i)	<ul style="list-style-type: none"> A primary key must have a unique value for each record (1 – AO1.2) – however it is possible for two films to have the same name (1 – AO2.1). 	2 AO1.2 (1) AO2.1 (1)	One mark (AO 1.2) for identification of appropriate reason. One mark (AO 2.1) for applying knowledge to given context.
	(ii)	<ul style="list-style-type: none"> A secondary key is indexed allowing for faster searching (1 – AO1.2) and users are likely to want to search by film (1 – AO2.1). 	2 AO1.2 (1) AO2.1 (1)	One mark (AO 1.2) for identification of appropriate reason. One mark (AO 2.1) for applying knowledge to given context.
	(c)*	<p>Mark Band 3–High Level (7-9 marks)</p> <p>The candidate demonstrates a thorough knowledge and understanding of a wide range of legal issues the company might have considered and suggests extensive measures that the company can take to ensure compliance; the material is generally accurate and detailed.</p> <p>The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation.</p> <p>The candidate provides a thorough discussion which is well-balanced. Evaluative comments are consistently relevant and well-considered.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p>	9 AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	<p>AO1: Knowledge and Understanding</p> <p>The following is indicative of possible factors/evidence that candidates may refer to but is not prescriptive or exhaustive:</p> <p>Legal (I)ssues and (S)olutions:</p> <ul style="list-style-type: none"> (I) Company needs to ensure it has the right to stream the films it does... (S)...It can do this by approaching the copyright holder and buying a licence to use it. (I) Having a peer to peer model may affect this as often a distinction is drawn in contracts between streaming and downloading media. (S)...One way round this may be to ensure that the cache is encrypted. (I) The company may be allowed to stream to users on in one particular country... (S)...To do this it can filter users by IP address or the address to which their credit card is registered. (I) Laws in a country may restrict some films being viewed by people of certain ages...

Question	Answer	Marks	Guidance
	<p>Mark Band 2 –Mid Level (4-6 marks) The candidate demonstrates reasonable knowledge and understanding of a range of legal issues the company might have considered and suggests some measures that the company can take to ensure compliance; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation The candidate provides a reasonable discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed. <i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p>Mark Band 1-Low Level (1-3 marks) The candidate demonstrates a basic knowledge of legal issues and matters of compliance with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides a limited discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. <i>The information is basic and</i></p>		<ul style="list-style-type: none"> • (S) ...Users can be required to register by credit card for which they must be 18. • (I) Will be required to store data about customers meaning it must act according to the DPA... • (S)... It must register to the ICO ensure its data is kept securely and adhere to the principles of the DPA. <p>AO2.1: Application The selected knowledge/examples should be directly related to the specific question. The example below is not prescriptive or exhaustive:</p> <ul style="list-style-type: none"> • Discussion on the copyright and patents act related to the context • Discussion on the data protection act for users • Discussion on computer misuse act <p>AO3.3: Evaluation Candidates will need to consider computing related laws in relation to the question and will make some comments evaluating the issues and solutions they are discussing. The following is indicative of possible evaluation points that candidates may refer to but is not prescriptive or exhaustive:</p> <ul style="list-style-type: none"> • Why companies need to comply with computing related laws? • What are the risks if a company is not complying with the data protection act for users involved? • Discuss the quality of films and services that will be available to users either from company's servers compared to a user's computers • Discuss the legal implications of streaming films

Question		Answer	Marks	Guidance
		<p><i>communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks No attempt to answer the question or response is not worthy of credit.</p>		from users computers rather than directly from the company's servers.
3	(a)	<ul style="list-style-type: none"> It outputs 3 (1). 	<p>1 AO3.3 (1)</p>	For 1 mark.
	(b)	(i)	<ul style="list-style-type: none"> Performs subtraction (1). 	<p>1 AO2.1 (1)</p> <p>For 1 mark.</p>
		(ii)	<ul style="list-style-type: none"> The accumulator (1). 	<p>1 AO2.1 (1)</p> <p>For 1 mark.</p>
	(c)	(i)	<ul style="list-style-type: none"> Calculates the remainder of two numbers when the second is divided by the first (1). 	<p>1 AO2.1 (1)</p> <p>For 1 mark. Accept finds modulo/modulus.</p>
		(ii)	<ul style="list-style-type: none"> Code takes in two values and provides an output (1). The output is the modulus of the two inputs (1). 	<p>2 AO3.2 (2)</p> <p>For 2 marks. Allow follow through for second mark if output matches answer to c(i). Accept MOD, % or any existing alternative. Accept if candidate has calculated modulus using alternative method (e.g. using a loop).</p> <p>Example: arg1=input("Enter first number") arg2=input("Enter another number") ans=arg1 MOD arg2</p>

Question			Answer	Marks	Guidance
					<code>print(ans)</code>
4	(a)		00101011	1 AO1.2 (1)	For 1 mark.
	(b)		00011010	2 AO1.2 (2)	For 2 marks. 1 mark for correct answer plus an additional method mark for showing borrowed bits. No method mark for converting numbers to denary performing subtraction and converting back to binary. Allow full marks for converting second number to two's complement and performing addition.
	(c)		11010101	2 AO1.2 (2)	For 2 marks – showing valid method 1 mark.
	(d)	(i)	0111 0001	2 AO1.2 (2)	For 2 marks – 1 mark for mantissa 1 mark for exponent.
		(ii)	1001 0001	2 AO1.2 (2)	For 2 marks – 1 mark for mantissa 1 mark for exponent.
5	(a)	(i)	$t \equiv g \wedge s \vee c \wedge f$	3 AO2.1 (3)	For 3 marks. 1 mark for \wedge used to conjoin g and f to rest of expression. 1 mark for $s \vee c$. 1 mark for brackets around $s \vee c$.

Question		Answer	Marks	Guidance
				Give full marks to any equivalent expression. Accept different notations. $t \equiv g . s + c . f$
	(ii)	<pre>t=false if g and (s or c) and f then (1) t=true (1) endif</pre>	2 AO3.2 (2)	For 2 marks. Accept forms. $g==true \text{ and } (s==true \text{ or } c==true) \text{ and } f==true$ $g=true \text{ and } (s=true \text{ or } c=true) \text{ and } f=true$ Accept && and operators. Allow follow through mark from 5a)i).
6		Simplified expression: $B \vee (\neg C \wedge \neg D)$ 	4 AO2.1 (4)	For 4 marks. 1 mark for simplified expression: $B \vee (\neg C \wedge \neg D)$ 1 mark for filling in table correctly. 1 mark for identifying each grouping (maximum 2). Allow follow through if table filled incorrectly giving one mark for each valid grouping if it is the most efficient possible to a maximum of two marks.

Question		Answer	Marks	Guidance
7	(a)	<ul style="list-style-type: none"> • Appropriate tags to make Reasons to Choose Us subheading (e.g. h1, h2, h3). Accept b or strong if accompanied by attribute to make increase font size (1). • Laser Tag italicised (e.g. i or em) (1). • ul used for bulleted list (1). • li to mark out elements of list (1). 	<p>4 AO3.2 (4)</p>	<p>Up to 4 marks - 1 mark for each correct step in process.</p> <p>Example:</p> <pre><h2>Reasons to Choose Us</h2> Come play Laser Tag with us for: State of the art equipment Friendly staff Match recordings available to purchase Buy two games get one free </pre> <p>Accept answers where same effect is achieved using style attribute.</p>
	(b)	(i)	<ul style="list-style-type: none"> • A programming language that runs in a web browser (1) that can be embedded into HTML (1) with <script> tag (1) to add interactivity to a page (1). 	<p>2 AO1.1 (2)</p> <p>Up to 2 marks for a valid description.</p>

Question			Answer	Marks	Guidance
		(ii)	<ul style="list-style-type: none"> JavaScript is likely to be run on a variety of machines (1) with different processors/architectures (1). Compiled code is machine dependent (1) whereas interpreters run on high level code (1) which is machine independent (1). 	2 AO1.2 (2)	Up to 2 marks for a valid explanation.
	(c)		<ul style="list-style-type: none"> Team scores are initialised (prior to loop) (1). Iterates through array correct number of times (1). Checks the team the player is on (1). If the player is green adds score to the greenTeam (1). If the player is red adds score to the redTeam (1). Outputs result in a sensible manner (1). 	6 AO3.2 (6)	Up to 6 marks - 1 mark for each correct step in process. Any program with the specified functionality should receive full marks. Example: <pre> greenTeam = 0 redTeam = 0 for i=0 to 19 if player[i,0]==1 then greenTeam=greenTeam+players[i,1] else redTeam=redTeam+players[i,1] endif next i print("Green Team: "+greenTeam) print("Red Team: "+redTeam) </pre>

Assessment Objectives (AO) Grid

Question	AO1.1	AO1.2	AO2.1	AO2.2	AO3.1	AO3.2	AO3.3	Total
1(a)(i)	1	0	0	0	0	0	0	1
1(a)(ii)	0	0	2	0	0	0	0	2
1(b)(i)	0	0	2	0	0	0	0	2
1(b)(ii)	0	2	0	0	0	0	0	2
1(c)*	2	2	2	0	0	0	3	9
2(a)(i)	1	0	0	0	0	0	0	1
2(a)(ii)	0	0	2	0	0	0	0	2
2(b)(i)	0	1	1	0	0	0	0	2
2(b)(ii)	0	1	1	0	0	0	0	2
2(c)*	2	2	2	0	0	0	3	9
3(a)	0	0	0	0	0	0	1	1
3(b)(i)	0	0	1	0	0	0	0	1
3(b)(ii)	0	0	1	0	0	0	0	1
3(c)(i)	0	0	1	0	0	0	0	1
3(c)(ii)	0	0	0	0	0	2	0	2
4(a) <i>m</i>	0	1	0	0	0	0	0	1
4(b) <i>m</i>	0	2	0	0	0	0	0	2
4(c) <i>m</i>	0	2	0	0	0	0	0	2
4(d)(i) <i>m</i>	0	2	0	0	0	0	0	2
4(d)(ii) <i>m</i>	0	2	0	0	0	0	0	2
5(a)(i) <i>m</i>	0	0	3	0	0	0	0	3
5(a)(ii)	0	0	0	0	0	2	0	2
6 <i>m</i>	0	0	4	0	0	0	0	4
7(a)	0	0	0	0	0	4	0	4
7(b)(i)	2	0	0	0	0	0	0	2
7(b)(ii)	0	2	0	0	0	0	0	2
7(c)	0	0	0	0	0	6	0	6
Totals	8	19	22	0	0	14	7	70

* = extended response

m = mathematical content

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