National
Qualifications

CS(N5)22A

Computing Science

Marking Instructions

perfectpapers

General marking principles for National 5 Computing Science

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key.

(a) Marks for each candidate response must always be assigned in line with these general marking principles and the detailed marking instructions for this assessment.

(b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.

IMPORTANT
Within the marking instructions, elements of the same answer will be held within brackets, (and). These elements of the answer are not required but demonstrate more complete understanding if given.

Number			Question	Instructions	Marks
1			Describe how a real number is stored in a computer's memory.	Number is stored in two parts, the mantissa (which records the value of the number) and the exponent (which holds the number of binary places). **1 mark for mantissa** **1 mark for exponent**	**2**
2			Convert this denary number to an 8-bit binary number. 201	11001001 **(1 mark)**	**1**
3			A computer program is used to count the number of shoppers visiting a web site. State the most suitable data type to store the number of shoppers.	Integer **(1 mark)**	**1**
4			A programming language below uses ^ for exponentiation. SET newvalue TO input1value ^ input2value When coding, a programmer types ! instead of ^ leading to an error. State the type of programming error and describe its effect.	Type: Syntax **(1 mark)** Effect: • Code will not run • Code will not run as expected (! may be a valid operator) • Program terminates at error/line. • Error is reported **1 mark for any bullet**	**2**
5			SVG is a graphics format. An example of an SVG graphic is: (see paper)		
	a		State the name for this method of graphic representation.	Vector **(1 mark)**	**1**

<table>
<tr><th colspan="3">Number</th><th>Question</th><th colspan="5">Instructions</th><th>Marks</th></tr>
<tr><td></td><td>b</td><td></td><td>From the example, identify two attributes of the graphic with their values.</td><td colspan="5">Attribute with value form example
Co-ordinates (x=”0”, y=”0”)
Fill colour: “fill:rgb(0,0,255)”
Line colour: “stroke:rgb(0,0,0)”

1 mark for each attribute with example, max 2 marks
Both attributes only, 1 mark

Width and height are part of the representation of the common object so 0 marks if width and height given as attributes.</td><td>2</td></tr>
<tr><td>6</td><td></td><td></td><td>A computer processor makes use of memory locations with unique addresses, a data bus and an address bus.</td><td colspan="5"></td><td></td></tr>
<tr><td></td><td>a</td><td></td><td>Describe the purpose of the address bus.</td><td colspan="5">To identify a memory location to be accessed by the processor (1 mark).</td><td>1</td></tr>
<tr><td></td><td>b</td><td></td><td>Describe the purpose of the data bus.</td><td colspan="5">To allow data to be transferred from or to an identified memory location (1 mark)</td><td>1</td></tr>
<tr><td></td><td>c</td><td></td><td>Describe the purpose of memory locations with unique addresses.</td><td colspan="5">To store data during the operation of the computer where the data in a location that can be identified by its unique address (1 mark).</td><td>1</td></tr>
<tr><td>7</td><td></td><td></td><td>A computer program is used to manage the security lighting for a home. The following code is used to manage the lighting. The brightness for the lights is from 0 (0% brightness) to 100 (100% brightness). The light detected is 0 when there is no light and 100 in the full daylight. (see paper)</td><td colspan="5"></td><td></td></tr>
<tr><td></td><td>a</td><td></td><td>State the largest value for <code>lightval</code> that would result in line 12 being executed.</td><td colspan="5">50 (1 mark)</td><td>1</td></tr>
<tr><td></td><td>b</td><td></td><td>Complete this test table. (See paper)</td><td></td><td>light1

(line 04)</td><td>light 2

(line 05)</td><td>lightVal

(line 08)</td><td>brightness (line12)</td><td>2</td></tr>
</table>

<table>
<tr><th colspan="3">Number</th><th>Question</th><th>Instructions</th><th>Marks</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><td>Loop 1</td><td>32</td><td>32</td><td>32</td><td>68</td></tr>
<tr><td>Loop 2</td><td>20</td><td>22</td><td>21</td><td>47</td></tr>
<tr><td>Loop 3</td><td>15</td><td>19</td><td>17</td><td>30</td></tr>
<tr><td>Loop 4</td><td>10</td><td>12</td><td>11</td><td>19</td></tr>
</table>
2 marks for all three correct entries
1 mark if one error
</td><td></td></tr>
<tr><td></td><td>c</td><td></td><td>The program is supposed to make the outdoor lights brighter when less light is detected outside but the program doesn’t work as expected.</td><td></td><td></td></tr>
<tr><td></td><td></td><td>i</td><td>Describe the error in the program.</td><td>The value for brightness is always being subtracted from (1 mark).
This is because the brightness is not being set back to 100 before subtracting the light level (1 mark)</td><td>2</td></tr>
<tr><td></td><td></td><td>ii</td><td>Write code to resolve this error. Identify any lines of code you are replacing.</td><td>Options are:
Prior to Line 12 add the line
SET brightness TO 100
(remove line 02)

Amend Line 12 to
SET brightness TO 100 – lightval

1 mark for line/position to amend
1 mark for correct assignment</td><td>2</td></tr>
<tr><td></td><td>d</td><td>i</td><td>Explain what happens at line 14, if motion is detected for both motion1 and motion 2 sensors at the same time.</td><td>The OR comparisons means if either or both of the values is true then the IF statement is true (1 mark)
If both sensor values are true then lines 15 to 19 will be executed (1 mark)</td><td>2</td></tr>
<tr><td></td><td></td><td>ii</td><td>Explain the purpose of the variable <code>oldbrightness</code> in lines 15 to 19.</td><td>This holds the value of brightness, while the lights are turned on to 100 brightness, and is then used to reset them to the previous brightness (1 mark)</td><td>1</td></tr>
</table>

Number			Question	Instructions	Marks
8	a		A program will calculate the total cost for groups purchasing tickets for a water park. Adults pay £30 per ticket; children pay £15. If the size of the party is over 6 people, there is a discount of £5 per person which is subtracted from the total ticket cost. If there are no children in the party and there are not more than 6 adults, then an option to upgrade to the spa is offered at £10 per person. An algorithm for this is shown below. (see paper)		
	a		Using a design technique of your choice, design a solution for step 2 above.	• Complex condition for spa offer • Output/Input for spa option • Main calculation of totalCost • Calculation of party size with condition for discount on party size • Calculation of party size discount • Condition for spa option with calculation of additional cost **1 mark each bullet, max 6 marks**	**6**

				spa = "No"
				IF children = 0 AND NOT(adults >6) THEN
				SEND "Do you want to upgrade to the spa for £10 per person"
				RECEIVE spa FROM KEYBOARD
				END IF
				
				totalCost = (adults * 30) + (children * 15)
				party = adults + children
				IF party > 6 THEN
				totalCost = totalCost – (party * 5)
				END IF
				IF spa = "Yes" THEN
				totalCost = totalCost + (10 * adults)
				END IF	

Number			Question	Instructions	Marks
	b		As part of a new promotion for the Water Park, customers with children, who spend more than £90, are offered tokens for a child friendly area of the water park. (see paper)		
		i	State the output if totalCost is 150 totalCost is 85	 You have 100 tokens for the play area. **(1 mark)** No output is shown **(1 mark)**	**2**
		ii	When the code is tested, a user enters 2.5 for the number of children. The program continues to run and calculates the total cost. Explain how the program could be made fit for purpose.	• Design user interface so only integer output can be selected/accepted. • Input validation to only accept whole number values with notification to customer. **1 mark for any one bullet**	**1**
	c		The water park has a web site that customers use to purchase their tickets. The web site has a firewall. Describe two features of the role of a firewall.	Check incoming packets meet specific rules by checking: • Source IP address • Receiver IP addess • Port numbers • Protocols Also: • check that incoming packets meet specific rules before being allowed in. • set rules about how the web server can send or receive packets **One mark for each feature, max 2 marks**	**2**

Number			Question	Instructions	Marks
9.			Happy Shopper is an online store that uses a computer program to generate check digits for customer orders. An example order number would be 87212. To calculate the check digit, all the digits are added together and divided by 11. The remainder is the check digit. 8 + 7 + 2 + 1 + 2 = 20 20 / 11 = 1 remainder 9 so 9 is the check digit. A predefined function, called remainder, can be used to calculate the remainder. For example: SET checkdigit TO remainder(20, 11) Order numbers are stored in an array when the check digit is calculated. (see paper)		
	a		Using a design technique of your choice, design a solution that will calculate and display the check digit.	SET total TO 0 FOR EACH digit FROM ordernum SET total TO total + digit END FOR checkdigit = remainder(total,11) SEND checkdigit TO DISPLAY **1 mark for initialise total** **1 mark for loop for size of the array** **1 mark for adding to total** **1 mark for calculate and display checkdigit**	**4**
	b		This program used a predefined function called remainder.		

Number			Question	Instructions	Marks
		i	State another predefined function.	• random • round • length **1 mark for any bullet**	**1**
		ii	Explain, using an example, how the value returned by your predefined function in (i) is calculated from the parameters it is provided.	• Random(1, 10) will produce a random number in from 1 to 10 inclusive. • Round(value, 2) will round a value up or down to two decimal places. • Length(value) will give the length of the string (or array) value in characters/elements. **1 mark for example with parameter(s) and explanation of output**	**1**
	c		Once the check digit is calculated, it is printed, with the order number, on labels which are attached to each orders. e.g. (see paper) When posting the orders, an employee types the order number and check digit into a program which checks if this is correct. Complete missing parts of the design below.	Line 06 -> NOT(mycheck = checkdigit) **(1 mark)** Line 12 -> mycheck=checkdigit **(1 mark)** *Accept alternatives*	**2**
	d		A focus group is held with customers to discover what they want from the company to help them make a better online store. The group have been discussing what they want from an online store. Use the information above to identity two functional requirements for an improved online store.	• Secure login to update information • Store payment information • Search for products • Sort search results by price **1 mark each bullet, max 2 marks** **Accept variations.**	**2**

Number			Question	Instructions	Marks
10			A delivery company has an app which sends customers a notification when their delivery is 8 or fewer delivery stops away. The app then sends a message to the customer each time a delivery is completed, counting down the number of stops until the item is delivered to the customer. When the delivery is 8 or fewer stops away the customer receives: "Your package is now X stops away." Where X is the number of stops until the delivery to the customer. After the item is delivered, a message is sent to the customer: "Your item was delivered" The data for the delivery notifications is shown below. It is stored in the order of the deliveries.		**1**
	a		State the data structure used to store `deliveries`.	Array **(1 mark)**	
	b		Delivery drivers sometimes make over 150 deliveries in a day. One of the programming team says that the code for notifications is not efficient. Explain why this code is not efficient.	Each time a delivery is completed, all the contents of the deliveries array are processed to send the notifications **(1 mark)**. Any deliveries already completed don't need to be processed and any deliveries more than 8 stops away also do not need to be processed **(1 mark)** This additional processing is not required, making the current solution inefficient.	**2**
	c		Using a design technique of your choice, design a suitable input validation to ensure that only valid input of either "Yes" or "No" is accepted at line 04.	One mark each for: • Loop with condition • Testing input is valid • Response when incorrect	**3**

Number			Question		Instructions	Marks

			Line 04
			Line 05
			Line 06
			Line 07
			Line 08
			Line 09
			Line 10
			Line 11
				REPEAT
				valid = true
				RECEIVE response FROM KEYBOARD
				IF NOT(response = “Yes” OR response =”No”) THEN
				Valid = false
				SEND “Incorrect value, try again” TO DISPLAY
				END IF
				UNTIL true		

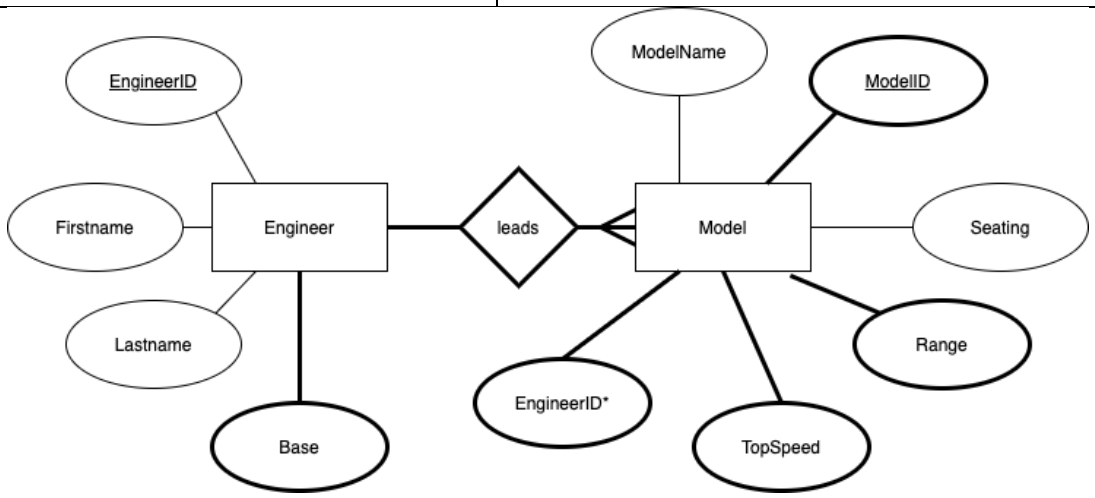
	d		Any response from the driver means that the delivery has been completed. In the next version of the program, a response of “Yes” means the deliver was successful but a response of “No”, means to try to deliver the next day. Amend the code from lines 08 to 10, adding additional code so that the correct notification is sent, depending on the response from the driver.		• **1 mark for adding complex condition (line 8)** • **1 mark for adding complex condition (line 11)** • **1 mark for correct structure for program logic** • **1 mark for adding additional notification (line 12)**	**4**

			Line 08
			Line 09
			Line 10
			Line 11
			Line 12
			
			Line 13
				IF (deliveryOrder = deliveryNum) AND response = "Yes" THEN
				<send “Your item was delivered” to deliveries[deliveryNum]>
				END IF
				IF (deliveryOrder = deliveryNum) AND response = "No" THEN
				<send “We will try to deliver tomorrow” to deliveries[deliveryNum]>
				ELSE		

	e		Give two reasons why the delivery programme would be compiled to run on the phones of delivery drivers.		Any one from: • translator does not need to be present when executing • program would not need to be translated again • program runs/executes faster as it does not require further translation • program needs to be converted to binary to run • to identify a list of errors in the code • compiled version of the program requires less memory (RAM). *No mark for “runs faster” on its own with no explanation.* **1 mark each bullet, max 2 marks**	**2**

Number			Question	Instructions	Marks
11			A mobile phone company offers a range of benefits to customers as add-ons to their monthly subscriptions. The monthly costs of these benefits are held in a database. Part of the database table is shown below. (see paper) A programmer writes the following SQL statement to update the discount for Next. UPDATE Benefit SET costMonthly TO 4.99 WHERE benefitType = "Discount";		
	a		Explain why the SQL statement above would give an unexpected result.	Next is not the only discount so this would update all the Discount benefitTypes to a costMonthly of 4.99. **(1 mark)**	**1**
	b		Rewrite the SQL statement to give the expected output.	• UPDATE Benefit SET costMonthly to 4.99 • WHERE company="Next" **1 mark for each bullet, max 2 marks** *Also accept WHERE benefitID = 0032*	**2**
12			The output below was produced by running a query in the database. (see paper) Complete the SQL statement used to produce this sorted output.	• Lastname ASC, • lastLogin DESC **1 mark each bullet, max 2 marks**	**2**

Number			Question	Instructions	Marks
13			A business is developing an app to allow customers to sign-in and place orders. During testing, an account is added to the service that allows a user to view all the personal details of customers, see payment data and information about transactions. When testing was completed and the app was published for customers, this account was not removed and appears to have been discovered by customers using the app. State the requirement of the UK General Data Protection Regulation (UK GDPR) that the company has failed to comply with.	To ensure that data must be held securely. **(1 mark)**	**1**
14			ScotiMon is a digital card game, where players use cards representing digital pets which battle against each other. (see paper)		
	a		When the database was designed, it was important that HealthPoints was a number from 1 to 150. Describe what was done to ensure HealthPoints is entered correctly.	A range check (added to the HealthPoints field). **1 mark**	**1**
	b		Design a query to display the creature, health points, with skills that have a value of "20" or "20+".	• Creature,HealthPoints with no other fields • Card, Skill • Skill = "20" OR • Skill = "20+" **1 mark each bullet, max 4 marks** **Only 1 mark possible for WHERE clause if logical operator not included.**	**4**

Number			Question	Instructions	Marks
	c		A creature is added to the database: (see paper) Explain why this new entry in the database breaks referential integrity.	A value for SkillID is added as a foreign key **(1 mark)** which does not have a related primary key **(1 mark)** *1 mark for answer without mention of foreign/primary keys but does talk about value not present in Skill table.*	**2**
	d		A query is required to add a new skill to the database. Write SQL to add this record to the database.	• INSERT INTO Skill • VALUES • (2001, "Sling Shot", 30, "None") **1 mark each bullet, max 3 marks**	**3**
15			A company makes a range of electric cars. Each car model has a lead engineer. Some engineers work on more than one model.		
	a		Complete the entity relationship diagram below by: • drawing any missing attributes from either entity • drawing the relationship between the entities • naming the relationship between the entities • • identifying any additional key fields	**1 mark for foreign key** **1 mark for primary key** **1 mark for relationship of the correct type** **1 mark for suitable name for relationship** **1 mark Model attributes TopSpeed, Range** **1 mark for Engineer attribute Base**	**6**
					

Number			Question	Instructions	Marks
	b		An SQL query is written which produces the following output. (see paper) Write an SQL query to produce the output above.	SELECT Base, ModelName, Range, Firstname, Lastname FROM Engineer, Model WHERE Engineer.EngineerID = Model.EngineerID AND Range >= 360 **1 mark for SELECT clause with <u>fields in correct order</u>** **1 mark for EquiJoin** **1 mark for remaining WHERE clause (Range >= 360 or similar to produce required result** **Max 3 marks**	**3**
16.			Add HTML body, head and title opening and closing elements to complete the code below.	**Each pair of open/close elements, 1 mark each, max 3 marks** • head • title • body	**3**
			<html> <head> <title>Maintenance Page</title> </head> <body> This site is currently offline for maintenance </body> </html>		
17.			A web designer has two images available to use in a web site. Both images are the same resolution. (see paper) State two advantages of using PNG rather than JPG.	• PNG is lossless whereas JPG is a lossy format so will lose detail. • PNG is lossless so will not suffer from 'artifacts' due to compression which appear in JPG. • PNG supports alpha transparency whereas JPG does not. **1 answer relating to lossless/compression - 1 mark** **1 answer relating to transparency - 1 mark**	**2**

Number			Question	Instructions	Marks
18.			An energy company want to share information about energy costs with customers through a page on their web site. A screenshot of the completed page is shown below. (see paper). Evaluate the web page, in terms of fitness for purpose.	The page is not fit for purpose as there is no pricing information on it **(1 mark)**.	**1**
19.			A health food business wants to open a web site so customers can order online.		
	a		A structure for the web site is developed. This is represented on the home page as: • Home • Food • Vegan • Supplements • Specials Write HTML to create this menu.	• ul (open and close) • li (open and close for each item) • a (open and close with each link correct) • Correct linked text within correctly nested tags **1 mark each bullet, max 4 marks**	
			   Home Food Vegan Supplements Specials 		**4**
	b		A page listing products is shown below. (see paper) The following HTML generates part of the page. (see paper)		

Number			Question	Instructions	Marks

		i	Write the CSS rule for productheading.	`.productheading {`
				`  text-align: center;`
				`  font-family: Verdana;`
				`}`
				
				1 mark for use of class selector
				1 mark for text-align property
				1 mark for font-family property
					3

		ii	A rule is defined for producttext but no rule is defined for maintext. Describe how this will affect the text in the "maintext" DIV.	CSS rules inherit **(1 mark)** the properties of the rules which they are nested within. In this case, as there are no proprieties set for "maintext" and it is nested in a DIV with the class "producttext", it will use all the properties of "producttext" **(1 mark).**	**2**
		iii	An id is used with the anchor element: id="link1" Describe the difference between an id and a class.	An ID should identify a single element within the page **(1 mark)** whereas a class is used to style multiple elements **(1 mark)**.	**2**
	c		When a user moves the mouse pointer on to the "Buy Now" text, it changes to "Add to basket". Explain how a JavaScript event is used to implement this feature.	The onMouseOver event **(1 mark)** calls a JavaScript function CustomerOut **(1 mark)** which changes the link text. **1 mark for the onMouseOver event** **1 mark for use of function/JavaScript to change**	**2**
	d		The product page is tested to ensure the links and navigation work as expected. State two other examples of tests that can be carried out on a web page.	• matches user-interface design • links and navigation work correctly • media (such as text, graphics, and video) display correctly **1 mark for each bullet, max 2 marks**	**2**
20			A web developer is creating two websites for a customer. These will be held on two web servers as shown. (see paper)		

Number			Question	Instructions	Marks
	a		The file, welcome.html, contains two hyperlinks. Link 1 uses relative addressing and Link 2 uses absolute addressing. Write the addresses for each hyperlink.	*Link 1:* /local/farms.html **(1 mark)** *Link 2:* https://help.icecreamvillage.com/health/allergies.html **(1 mark)**	**2**
	b		During the design process, low-fidelity prototypes are used. Describe two ways that low-fidelity prototypes would be used in the development of the web sites.	Low-fidelity prototypes can be used to: • generate early feedback from users on the look/feel of the site. • test navigation works as expected with real users • check for consistency of design across pages • other valid **1 mark each bullet, max 2 marks**	**2**

Question paper mark breakdown

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
1	1	short answer	Application of knowledge of computer systems	Computer systems (CS)	2	C	Describe floating point representation of positive real numbers using the terms mantissa and exponent.	
2	1	short answer	Application of knowledge of computer systems	Computer systems (CS)	1	C	Convert from binary to denary and vice-versa.	
3	1	short answer	Design	Software Development and Design (SDD)	1	C	Identify the data types and structures required for a problem that relates to the implementation at this level.	
4	1	short answer	Testing	Software Development and Design (SDD)	2	C	Describe and identify **syntax**, execution, and logic errors.	
5a	1	short answer	Application of knowledge of computer systems	Computer systems (CS)	1	C	Describe the vector graphics method of graphic representation for common objects.	
5b	1	short answer	Application of knowledge of computer systems	Computer systems (CS)	2	C	Describe the vector graphics method of graphic representation for common objects with attributes: co-ordinates,fill colour, line colour	

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
6a	1	short answer	Application of knowledge of computer systems	Computer systems (CS)	1	C	Describe the purpose of the basic computer architecture components and how they are linked together: buses (address)	
6b	1	short answer	Application of knowledge of computer systems	Computer systems (CS)	1	C	Describe the purpose of the basic computer architecture components and how they are linked together: buses (data)	
6c	1	short answer	Application of knowledge of computer systems	Computer systems (CS)	1	C	Describe the purpose of the basic computer architecture components and how they are linked together: memory locations with unique addresses	
7a	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	1	C	Read and explain code that makes use of the above constructs.	
7b	1	extended answer	Testing	Software Development and Design (SDD)	2	C	Describe, identify, exemplify, and implement normal, extreme, and exceptional test data for a specific problem, using a test table.	
7ci	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	2	A	Describe and identify syntax, execution, and logic errors.	Identify logic errors in code and their effect, Depth of problem solving: length of code required/to be read

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
7cii	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	2	A	Describe, exemplify, and implement the appropriate constructs in a high-level (textual) language.	identify the correct sequence required to implement a solution to a problem
7di	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	2	A	Read and explain code that makes use of the above constructs.	read, write and show understanding of complex code - complex conditions
7dii	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	1	C	Read and explain code that makes use of the above constructs.	
8a	1	extended answer	Design	Software Development and Design (SDD)	4	A	Exemplify and implement one of the above design techniques to design efficient solutions to a problem	design, code and interpret problems with multiple stages
8a	1	extended answer	Design	Software Development and Design (SDD)	2	C	Exemplify and implement one of the above design techniques to design efficient solutions to a problem	
8bi	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	2	C	Read and explain code that makes use of the above constructs.	

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
8bii	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	1	C	Describe, exemplify, and implement standard algorithms: input validation OR Describe, exemplify, and implement user-interface design, in terms of input and output, using a wireframe.	
8c	1	extended answer	Application of knowledge of computer systems	Computer systems (CS)	2	C	Describe the role of firewalls.	
9a	1	extended answer	Design	Software Development and Design (SDD)	6	A	Identify the data types and structures required for a problem that relates to the implementation at this level. Exemplify and implement one of the above design techniques to design efficient solutions to a problem.	design, code and interpret problems with multiple stages. read, write and show understanding of complex code: arrays
9bi	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	1	C	predefined functions (with parameters): random, round, length	
9bii	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	1	C	predefined functions (with parameters): random, round, length	

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
9c	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	2	A	Describe, exemplify, and implement the appropriate constructs in a high-level (textual) language: conditional loops, NOT	read, write and show understanding of complex code - unnatural thought processes (while, NOT), arrays
9d	1	extended answer	Analysis	Software Development and Design (SDD)	2	C	Identify the purpose and functional requirements of a problem that relates to the design and implementation at this level	
10a	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	1	C	Describe, exemplify, and implement appropriately the following data types and structures: 1-D array	
10b	1	extended answer	Evaluation	Software Development and Design (SDD)	2	A	Describe, identify, and exemplify the evaluation of a solution in terms of: efficient use of coding constructs	demonstrate knowledge of efficient code
10c	1	extended answer	Design	Software Development and Design (SDD)	3	C	Exemplify and implement one of the above design techniques to design efficient solutions to a problem.	
10d	1	extended answer	Implementation (read and write code)	Software Development and Design (SDD)	4	A	Describe, exemplify, and implement the appropriate constructs in a high-level (textual) language	Combined use of multiple constructs, length of code required to read, nesting of constructs

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
10e	1	extended answer	Application of knowledge of computer systems	Computer systems (CS)	2	A	Explain the need for interpreters and compilers to translate high-level program code to binary (machine code instructions).	Interpreters and compliers
11a	2	short answer	Evaluation	Database Design and Development (DDD)	1	C	Read and explain code that makes use of the above SQL.	
11b	2	short answer	Implementation (read and write code)	Database Design and Development (DDD)	2	C	Describe, exemplify and implement SQL operations for pre-populated relational databases: Update. Where =	
12	2	short answer	Implementation (read and write code)	Database Design and Development (DDD)	2	A	order by with a maximum of two fields	queries using SQL where the output is sorted on two fields
13	2	short answer	Design	Database Design and Development (DDD)	1	C	Describe and identify the implications for individuals and businesses of the UK General Data Protection Regulation (UK GDPR) that data must be: held securely	
14a	2	extended answer	Design	Database Design and Development (DDD)	1	C	Describe and exemplify a data dictionary: validation: range	
14b	2	extended answer	Design	Database Design and Development (DDD)	4	A	Exemplify a design of a solution to the query: multiple tables, search criteria	queries using SQL with multiple clauses in the WHERE statement; any problem that requires data from adjacent tables (one join)

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
14c	2	extended answer	Implementation (read and write code)	Database Design and Development (DDD)	2	C	Implement relational databases with two linked tables, to match the design with referential integrity.	
14c	2	extended answer	Implementation (read and write code)	Database Design and Development (DDD)	3	C	Implement relational databases with two linked tables: insert	
15a	2	extended answer	Design	Database Design and Development (DDD)	6	C	Describe and exemplify entity-relationship diagrams with two entities indicating: entity name, attributes, relationship (one-to-many)	
15b	2	extended answer	Implementation (read and write code)	Database Design and Development (DDD)	3	A	Describe, exemplify and implement SQL operations for pre-populated relational databases, with a maximum of two linked tables: SELECT, FROM , WHERE, AND, Equi-join between tables	any problem that requires data from adjacent tables (one join) queries using SQL with a multiple clauses in the WHERE statement
16	3	short answer	Implementation (read and write code)	Web Design and Development (WDD)	3	C	Describe, exemplify and implement HTML code: head, title, body	

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
17	3	short answer	Design	Web Design and Development (WDD)	2	C	Compare a range of standard file formats: bit-mapped graphic standard file formats JPEG and PNG in terms of compression, animation, transparency, and colour depth	
18	3	short answer	Evaluation	Web Design and Development (WDD)	1	C	Evaluate solution in terms of: fitness for purpose	
19a	3	extended answer	Implementation (read and write code)	Web Design and Development (WDD)	4	C	Describe, exemplify and implement HTML code: link, ul and li	
19bi	3	extended answer	Implementation (read and write code)	Web Design and Development (WDD)	3	A	Describe, exemplify and implement internal and external Cascading Style Sheets (CSS): classes; text: font (family, size), alignment	use of classes, ids and anchors
19bii	3	extended answer	Implementation (read and write code)	Web Design and Development (WDD)	2	C	Read and explain code that makes use of the above CSS.	
19biii	3	extended answer	Implementation (read and write code)	Web Design and Development (WDD)	2	A	Read and explain code that makes use of the above CSS. Classes and IDs.	use of classes, ids and anchors; identification of when to apply a single CSS rule set to multiple HTML elements

Qu	Section	Type	Skills	Content	Marks	QuType	CAS Item	A type justification
19c	3	extended answer	Implementation (read and write code)	Web Design and Development (WDD)	2	C	Describe and identify Javascript coding related to mouse events: Onmouseover	
19d	3	extended answer	Testing	Web Design and Development (WDD)	2	C	Describe and exemplify testing:matches user-interface design, media (such as text, graphics, and video) display correctly, consistency	
20a	3	extended answer	Implementation (read and write code)	Web Design and Development (WDD)	2	A	Describe and implement hyperlinks (internal and external), relative and absolute addressing.	absolute and relative addressing
20b	3	extended answer	Design	Web Design and Development (WDD)	2	A	Describe, exemplify and implement prototyping (low-fidelity) from wireframe design at this level.	reasons for using prototypes

Short and extended response question distribution of marks

	Section 1 (Actual)	Section 2 (Actual)	Section 3 (Actual)
Short Response Questions	12	6	6
Extended Response Questions	43	19	19
	55	25	25

Proportion of A and C questions

	Section 1	Section 2	Section 3	Section 1 + 2	Section 1 + 3
A Marks	24	9	9	33	33
C Marks	31	16	16	47	47
			Total	80	80

		Analysis	Design	Implementation (read and write code)	Testing	Evaluation	Application of knowledge of computer systems	Totals
Software Development and Design (SDD)	Approx. 40	2	16	18	4	2	0	42
Database design and development (DDD)	25	0	12	12	0	1	0	25
Web Design and Development (WDD)	25	0	4	18	2	1	0	25
Computer systems (CS)	Approx. 15	0	0	0	0	0	13	13
		5%	30%	40%	10%	5%	10%	