National
Qualifications

CS(N5)18B

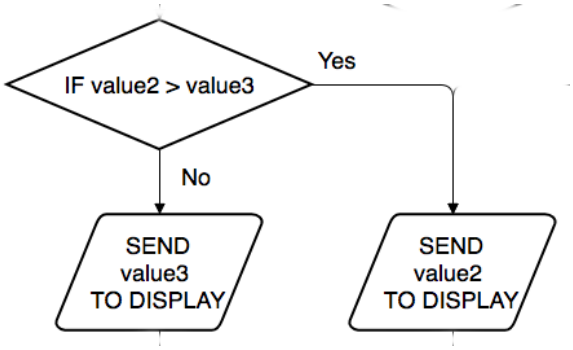
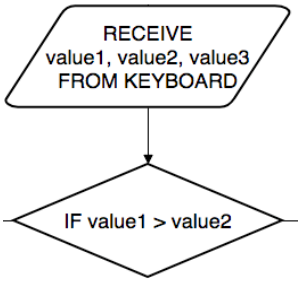
Computing Science
Marking Instructions

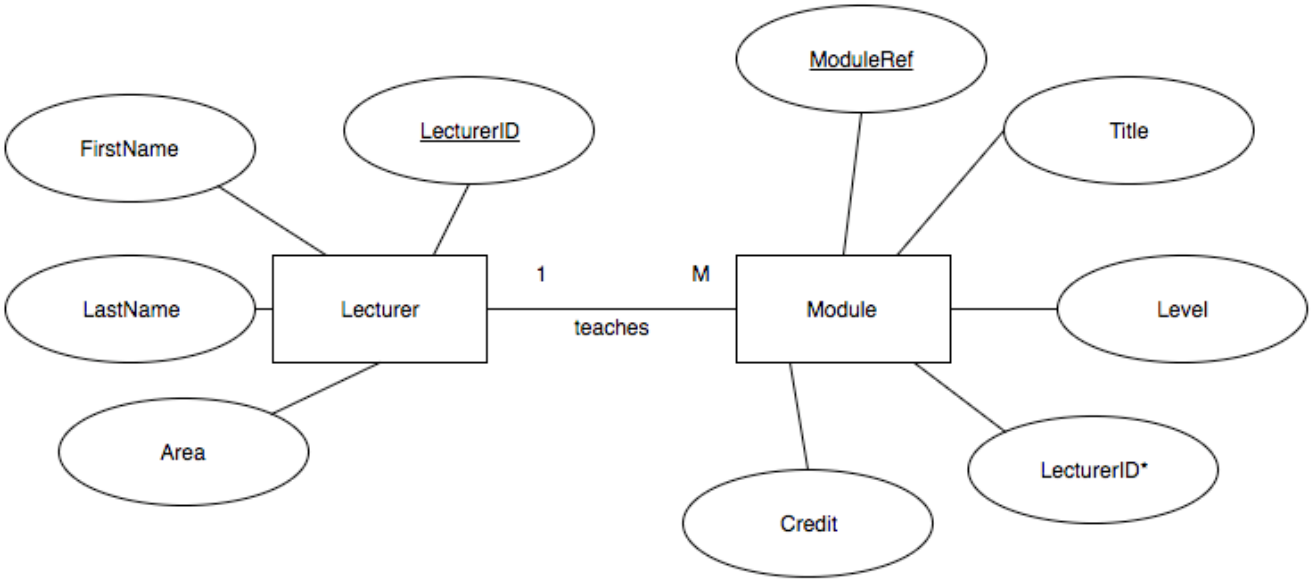
perfectpapers

Number			Question	Instructions	Marks
1			Convert the denary number 169 to binary.	10101001 in binary **(1 mark)**	**1**
2			A vector graphic file stores objects and their attributes.		
	a		State the name of the object shown above.	Rectangle **(1 mark)**	**1**
	b		State two attributes of this object.	Any from: • Width • Height • Line width • Line style • File colour • File style • Other valid **1 mark for each bullet, max 2**	**2**
3			This pseudocode allows a user to enter a capital letter from "A" to "F" when making a choice from a menu program. (see paper) Explain what happens if a user enters "X".	When X is entered condition at line 2 will be true (because X is greater than F) **(1 mark)** This causes the error message to be displayed and user is asked to enter the choice again **(1 mark)**	**2**
4			Sally is writing a program based on the following design. (see paper) State the name of each variable in the program and a suitable data type for each.	Variable 1: skillBonus **(1 mark)** Type: Boolean **(1 mark)** Variable 2: bonusPoints **(1 mark)** Type: Integer **(1 mark)**	**4**
5			A program is being tested. When the program is running a large number is entered and the following error message is displayed. The program then terminates. ERROR: Overflow error on Input		
	a		State the type of error that has been generated.	Execution **(1 mark)**	**1**

Number			Question	Instructions	Marks
	b		Explain why this error was not detected while the code was being written.	This error required the program code to be running for it to be detected **(1 mark)** Usually only syntax errors would be highlighted during the writing of the code **(1 mark)**	**2**
6			An audio file is stored at the following address https://mysounds.com/whitenoise.mp3 Write the HTML to play this file within a web page.	<audio controls> <source src=" https://mysounds.com/whitenoise.mp3" type="audio/mpeg"> </audio> **1 mark for open and close audio tag (with or without controls)** **1 mark for source tag** **1 mark for src attribute of source tag with correct address as given**	**3**
7			Kelly has developed a wireframe of a new web site for a customer. The next step is to develop a low-fidelity prototype.		
	a		Describe what is meant by a low-fidelity prototype.	A low-fidelity prototype is a version of the wireframe which can be interacted with **(1mark)**. Links and interactivity within the prototype function as they would in the finished site e.g. menus, mouse overs **(1 mark)**	**2**
	b		Describe how a low-fidelity prototype would be used with the customer.	The prototype can be used with the customer to get feedback on how suitable the proposed design is. **(1 mark)** *Answer should relate to feedback/usability responses from the customer.*	**1**
8			A school teacher has lost a laptop storing details of pupils.		
	a		Explain why this is a breach of the Data Protection Act 1998.	The act requires that data is held securely. Allowing data to be 'lost' on a laptop is not holding it securely **(1 mark)**	**1**

Number			Question	Instructions	Marks
	b		State two other implications for the teacher of **storing** pupil data.	Any two from the following: • Need for prior consent of data subject • Need to ensure data is accurate • Need to ensure data is used for limited and specifically stated purposes. **1 mark each bullet, max 2 marks**	**2**
9			This SQL statement is used to query a database system. SELECT * FROM car WHERE model = "XJS"		
	a		Explain what the expected output from this statement would be.	Will display all fields from table 'car' **(1 mark)** Where the model is equal to "XJS" **(1 mark)**	**2**
	b		The field **model** has a validation rule applied to it to ensure that it is never more than 8 characters. State the name given to this type of validation.	Field length **(1 mark)**	**1**
10			A design is created for a simple program. The design is shown below.		
	a		State the design technique used in this diagram.	Flow chart **(1 mark)**	**1**
	b		The design should produce a program which displays the largest number from the three entered. (see paper) The test data for three runs of the program are shown above. The data indicates there is an error in the design.		
		i	State the type of error in the design.	Logic error **(1 mark)**	**1**

Number			Question	Instructions	Marks
		ii	Describe how this error could be corrected. You may wish to write a description or re-draw part of the design.	Correct flow so that NO goes to SEND value3 TO DISPLAY **(1 mark)** and YES goes to SEND value2 TO DISPLAY **(1 mark)**  Correct diagram with altered YES/NO **1 mark each flow, max 2 marks**	**2**
	c		When implementing this solution, describe one advantage of using an interpreter and one advantage of using a compiler to translate the program code into binary.	Interpreter – any one from: • don't have to leave editing environment • position of errors in code • identified during test run **1 mark for any bullet** Compiler – any one from: • compiled code runs faster • code is only translated once • compiled code cannot be edited • compiled code requires less memory to execute **1 mark for any bullet**	**2**
	d		The following part of the program is executed.  Name the part of the processor which carries out each of the following tasks.		
	i		Carries out the comparison between value1 and value2.	ALU **(1 mark)**	**1**

Number			Question	Instructions	Marks
	ii		Receives the input for value1 and allocates it to memory.	Control Unit **(1 mark)**	**1**
11			A university offers modules to students. Here is an example of the data about lecturers and the modules they deliver. (see paper)		
	a		Complete the entity-relationship diagram below.	One mark each for: • one-to-many relationship drawn • relationship described • attributes for Lecturer drawn • primary key noted • LecturerID and Credit added to Module (with * foreign key added)	**5**
					
	b		A new lecturer is added to the database. The lecturer's details are as follows. (see paper) Explain if adding this data will have an impact on the referential integrity of the database.	Referential integrity is maintained **(1 mark)** because there are no lecturerID foreign keys in Module without a matching related primary key in lecturer **(1 mark)**	**2**

Number			Question	Instructions	Marks
	c		The database is queried using the following statement. SELECT LecturerID, FirstName, LastName FROM Lecturer, Module WHERE Lecturer.LectuerID = Module.LectuerID AND Lecturer.LecturerID = 2654 The query returns no data. Explain why this is the case.	The query uses a join between the two tables **(1 mark)** It looks for the lecturer with an ID of 2654 **(1 mark)** This lecturer has no entries in the linked table so no data is returned **(1 mark)**	**3**
	d		There are data entry errors in the database. All level 1 modules should be worth 1 credit. SQL is written to correct these errors. UPDATE Module SET Credit = 1 WHERE LecturerID = 2651 OR LecturerID =2655		
		i	Explain why this SQL Statement would not correct these errors.	Because there are lecturers other than these two that have level 1 modules **(1 mark)**	**1**
		ii	Explain why this SQL Statement would create additional errors in the database.	These lecturers are linked to courses at other levels and this SQL statement would change the credits for those modules as well **(1 mark)**	**1**
	e		The university wish to remove the following module from the database. (see paper)		
		i	Evaluate the effect of running the SQL statement below: DELETE FROM Module WHERE Title = "Contract law" AND Credit = "3"	Not fit for purpose **(1 mark)** There are two rows which match the given criteria in the SQL statement so both would be delete **(1 mark)**	**2**
		ii	Write an SQL statement which would be a more efficient way to remove the required data from the database.	DELETE FROM Module WHERE ModuleRef = "UG821" **(1 mark)**	**1**

Number			Question	Instructions	Marks
	f		Complete this SQL statement so that the resulting data is sorted by Level descending and Credit ascending. SELECT ModuleRef, Title, Level FROM Module	ORDER BY Level DESC **(1 mark)** , Credit ASC **(1 mark)** *Credit does not require ASC as this is the default*	**2**
12			GameHQ is a online gaming company. Megan has created a web site for them which is shown below.		
	a		Megan tests her website using a browser and notices a lack of consistency. Explain why the home page above lacks consistency.	Use of a range of fonts and font styles which are not consistent across the page **(1 mark)** Position and size of images with similar function is not consistent **(1 mark)**	**2**
	b		Each of the images shown in the homepage is a GIF.		
		i	State **two** reasons why a GIF is a suitable format for the images shown above.	Images have limited number of colours – GIFs have an adaptive palate **(1 mark)** Images have limited number of colours – GIFs have variable bit-depth (number of colours) so the number of colours can be changed to match the image **(1 mark)** GIFs make use of lossless compression so file sizes can be reduced without impacting on image quality **(1 mark)**	**2**
		ii	Megan is given a photograph which shows the guild members celebrating a recent completion win. (see paper) Megan saves this image as a GIF but is unimpressed by the results. Explain why saving this image as a GIF would result in a poor-quality image.	Photographic images are often stored as JPEGs – these use 24-bits for their colours (real colour) **(1 mark)** GIFs can display a maximum of 256 colours (8-bits). Therefore, the image will not accurately represent the original image **(1 mark)**	**2**
	c		Megan is to add an image file **Int2017.jpg** to a page. The image should have a caption that appears below it.		

Number			Question	Instructions	Marks
		i	Complete the HTML code below to display the image and caption.	<**DIV** class="figure"> <img src="**Int2017.jpg**" width="300" height="200" alt="2017 International Competition"> <**/P**> 2017 International Competition </**DIV**> **1 mark for open and close DIV tag** **1 mark for src = Int2017.jpg** **1 mark for /P tag**	**3**

		ii	This HTML code is to be styled based on the wireframe Megan created. (see paper)
			
			Complete the CSS code below to meet the requirements.
				.figure {
				width: 30%
				font-size:**smaller**;
				font-style: italic;
				text-align: center;
				border: thin silver solid;
				margin: auto;
				}
				1 mark for each correct declaration
					2

	d		Megan tests the website by ensuring that links in the site take the user to the correct destination. Describe two additional tests that could be performed on the website.	• graphic/text display correctly • styling is correct • consistency across pages • any media/interactive elements functions as expected **1 mark each bullet, max 2 marks**	**2**
	e		Megan has been asked to add a new web page to the site. The site is based on a recent magazine article about one of the guilds. (see paper) The page will include: • Information from the magazine article • Photographs from the magazine article • A game play video from the competition featured in the article. Using this information, draw a wireframe design for the new page.	Wireframe includes each of the following, **1 mark each**. • Text/heading from the magazine article • Images from the magazine article • Game play video *Elements should be annotated and layout clear.*	**3**

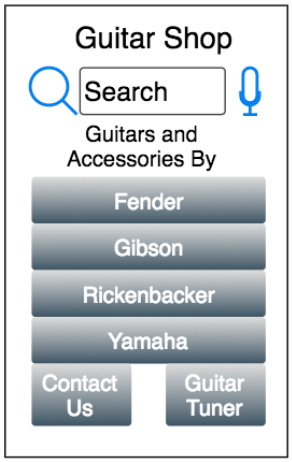
<table>
<tr><th colspan="3">Number</th><th>Question</th><th>Instructions</th><th>Marks</th></tr>
<tr><td></td><td>f</td><td></td><td>Megan includes the images and text from the magazine article however GameHQ has received a letter from the magazine's publishers which mentions breach of copyright.

Explain why the magazine has sent the letter.</td><td>GameHQ/Megan has used content where the copyright is owned by the magazine (1 mark)

Copyright content cannot be used without permission from (or licensing/fees paid to) the owner (1 mark)</td><td>2</td></tr>
<tr><td>13</td><td></td><td></td><td>Guitar Shop sells guitars and accessories. Guitar Shop maintains a database of all the products they have in stock. Some of the records from the relational database are shown below. (see paper)</td><td></td><td></td></tr>
<tr><td></td><td>a</td><td></td><td>Guitar shop's relational database contains primary and foreign keys.</td><td></td><td></td></tr>
<tr><td></td><td></td><td>i</td><td>State the purpose of a foreign key in a relational database.</td><td>To provide the link between two tables.
(1 mark)</td><td>1</td></tr>
<tr><td></td><td></td><td>ii</td><td>Complete the table below to identify the keys that were created when this relational database was implemented.</td><td><table><tr><th></th><th>Table</th><th>Field</th></tr><tr><td>Primary Key</td><td>Manufacturer</td><td>ManuCode</td></tr><tr><td>Primary Key</td><td>Product</td><td>ProdRef</td></tr><tr><td>Foreign Key</td><td>Product</td><td>ManuCode</td></tr></table>1 mark for each key, max 3 marks</td><td>3</td></tr>
<tr><td></td><td>b</td><td></td><td>When not in use, Guitar Shop staff switch off computer systems to reduce energy use. Describe two other methods of reducing the energy use of a computer system.</td><td>Any two from:
• set computers to go into sleep mode after a period of inactivity
• reduce monitor settings (brightness)
• activate hard disk shut down settings
• other valid
1 mark each bullet, max 2 marks</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td>When recommending a size of guitar to play staff at Guitar Shop using the following table. (see paper)</td><td></td><td></td></tr>
<tr><td></td><td>c</td><td></td><td>Analyse the problem and identify the input, the process and the output.</td><td>• Input: Age
• Process: decide which size of guitar based on age
• Output: size of guitar

1 mark each bullet, max 3 mark</td><td>3</td></tr>
</table>

Number			Question	Instructions	Marks
	d		Using a design technique of your choice, design an efficient solution to the problem of finding the correct size of guitar.		**5**
			Line 1 Input Age Line 2 IF Age <= 5 THEN Line 3 SET Recommend TO “Quarter Size” Line 4 ELSE Line 5 IF Age <=8 THEN Line 6 SET Recommend TO “Half Size” Line 7 ELSE Line 8 IF Age <=12 THEN Line 9 SET Recommend TO “Three Quarter Size” Line 10 ELSE Line 11 SET Recommend TO “Full Size” Line 12 END IF Line 13 END IF Line 14 END IF Line 15 SENT Recommend TO DISPLAY **1 mark for Selection Constructs** **1 Mark for Conditions Correct** **1 Mark for Use of Nesting/Conditions to deliver efficient solution** **1 mark for recommend assignment** **1 mark for Output of recommend**		**2**
	e		The program to find the correct size of guitar is implemented to match the design. State examples of exceptional and extreme test data that could be used when testing the program.	Exceptional: -1, "X", "£" Extreme: 0, 100 **1 mark for one example of each, max 2 marks**	**2**

Number			Question	Instructions	Marks
	f		Guitar Shop is developing a mobile application that will display: • an initial menu of manufacturers (when clicked will display all products by that manufacture on a separate screen). • A keyword search (including a voice input option) which will display matching search results on a separate screen. • Access to a guitar tuner screen. • Access to a "Contact Us" screen where a message can be sent to the shop. Create a user interface design, using the information above and the details of the manufacturers given here: Fender, Gibson, Rickenbacker, Yamaha	 **1 mark for initial menu with required items** **1 mark for including search box and option for voice (icon or command/button)** **1 mark for Guitar tuner** **1 mark Contact Us.**	**4**
14			16 people attend a quiz night and a program has been created which randomly assigns each person to one of four teams. A team is full if it has four people in it. If this is the case then the program tries to assign the person again until he or she is allocated to a team with a space. A design for the program is shown below. (see paper)		
	a		The line "SET team TO [0,0,0,0]" declares an array of integers. Explain the purpose of the array "team" in the design above.	The array is used to count the number of people in each team **(1 mark)** The element of the array is checked to see if there are already 4 people in the team **(1 mark)** If there are not then the element is incremented **(1 mark)**	**3**

Number			Question	Instructions		Marks
	b		Other than the array team, list the other variables and data types that would be required in implement the design. The first one has need done for you.	Variable name	Data type	3
				allocated	Boolean	
				name	String	
				assigned	Integer	
				1 mark each for variable name with correct type, max 3 marks		
	c		The program is tested with normal test data. The results are shown below. (see paper)			
		i	The program works with four people assigned to each of the four teams, however the teams are Team 0, Team 1, Team 2 and Team 3. Explain why this has happened.	The team array uses a zeroth index **(1 mark)** So, the random team is generated as from 0 to 3 **(1 mark)** When this is displayed, it will include a team 0 **(1 mark)**		3
		ii	This problem can be corrected by making a simple change to the program. You may wish a description or redraw an element of the diagram.	SET name, "you are in team", assigned + 1 TO DIPLAY **(1 mark)** *Increment assigned when displayed*		1
	d		When the program is translated, it is stored in memory. Describe how computer memory is organised so that the program can be accessed.	Computer memory is organised into unique locations **(1 mark)** which can each hold a specific number of bits/amount of data **(1 mark)**		2
15.			Read the following design for a solution to a problem. (see paper)			
	a		State which design technique has been used for the above solution.	Pseudocode **(1 mark)**		1
	b		State the output expected if the design is tested by Wendy Jones who has a date of birth of 27/09/2002.	JonesW20020927 All elements (Name, Initial, Year, Month, Day), **for 3 marks** 4 parts of the answer, **for 2 marks** 3 parts of the answer, **for 1 mark** Otherwise 0		3
	c		Refinement 3.1 stores the Id card number. State two programming constructs that would be required to implement this refinement.	Assignment **(1 mark)** Concatenation **(1 mark)**		2

Number			Question	Instructions	Marks
	d		A web site is created to display information about ID cards. (see paper) The image changes when the mouse moves over the image. (see paper)		
		i	State the language used to create dynamic content in web pages.	JavaScript **(1 mark)**	**1**
		ii	The graphic changes when the mouse pointer is placed over it. Identify the event in the code that causes the graphic to change.	onMouseOver **(1 mark)**	**1**
	e		The web site makes use of an external cascading style sheet. Describe what is meant by an external cascading style sheet.	Single file of styles **(1 mark)** that can be applied to multiple pages **(1 mark)**	**2**

Detail of Sources / Mark Allocations and Balance

Question	Mark	Area	Detail
1	1	CS	Convert from binary to denary and vice-versa.
2a	1	CS	vector graphics: common objects
2b	2	CS	vector graphics: attributes
3	2	SDD	Input validation
4	4	SDD	Variables and data types
5a	1	SDD	Describe and identify execution errors
5b	2	SDD	Describe and identify syntax errors
6	3	WDD	HTML tags: Audio
7a	2	WDD	Low-fidelity prototype
7b	1	WDD	Low-fidelity prototype
8a	1	DBDD	Data protection Act: Implications
8b	2	DBDD	Data protection Act: Implications
9a	2	DBDD	SQL: Select, From, Where
9b	1	DBDD	field length
	25	**25**	
10a	1	SDD	Design: Flow chart
10bi	1	SDD	Type of error: logic
10bii	2	SDD	Read and understand flowcharts
10c	2	CS	Compilers and Interpreters
10di	1	CS	ALU
10dii	1	CS	Control unit
11a	5	DBDD	Entity Relationship Diagram
11b	2	DBDD	Referential Integrity
11c	3	DBDD	SQL: Select AND
11di	1	DBDD	Testing: SQL: Update
11dii	1	DBDD	SQL: Update
11e	2	DBDD	Testing: SQL: DELETE
11eii	1	DBDD	SQL: DELETE
11f	2	DBDD	SQL: Order By Statement
12a	2	WDD	Consistency of style
12bi	2	WDD	image format: GIF
12bii	2	WDD	image format: GIF/JPG/PNG
12ci	3	WDD	HTML: div, p
12cii	2	WDD	CSS: font-size, text-alignment
12d	2	WDD	Testing:
12e	3	WDD	wire-framing:
12f	2	WDD	Copyright
13ai	1	DBDD	Foreign and primary keys
13aii	3	DBDD	Foreign and primary keys

13b	2	CS	Environmental impact: energy conservation
13c	3	SDD	Analysis: Input, Process, Output
13d	5	SDD	Design: Efficient solution
13e	2	SDD	Testing: Extreme and Exceptional Test Data
13f	4	SDD	User interface design
14a	3	SDD	1-D arrays
14b	3	SDD	data types
14ci	3	SDD	Read and explain code
14cii	1	SDD	Assignment
14d	2	CS	Memory locations with unique addresses
15a	1	SDD	Pseudocode
15b	3	SDD	Concatenation
15c	2	SSD	Read and explain code
15di	1	WDD	Javascript
15dii	1	WDD	JavaScript: OnMouseOver
15e	2	WDD	CSS: External Style Sheet
	85		