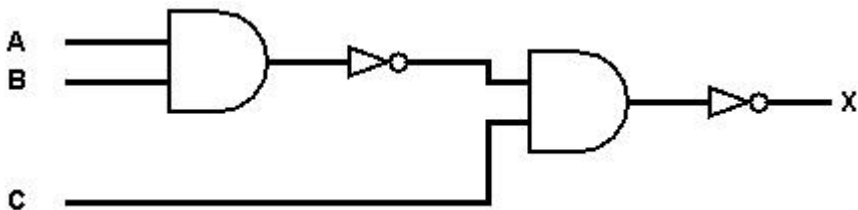
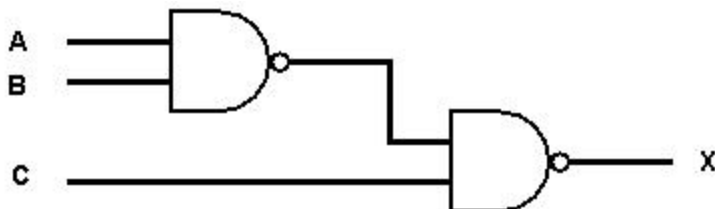


Question	Answer	Marks
1	<p><b>1 mark</b> for 3 correct lines only from Data Security <b>1 mark</b> for 2 correct lines only from Data Integrity</p> <pre>graph LR; Firewall --&gt; DS[Data Security]; DoubleEntry[Double entry] --&gt; DS; PresenceCheck[Presence check] --&gt; DI[Data Integrity]; AccessRights[Access rights] --&gt; DS; Password --&gt; DI;</pre>	2

Question	Answer	Marks																														
2(a)	<p><b>1 mark</b> for each completely correct truth table</p> <p><b>NOR</b></p> <table><tr><th>A</th><th>B</th><th>Output</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table> <p><b>NAND</b></p> <table><tr><th>A</th><th>B</th><th>Output</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	A	B	Output	0	0	1	0	1	0	1	0	0	1	1	0	A	B	Output	0	0	1	0	1	1	1	0	1	1	1	0	2
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2(b)	<p><b>1 mark</b> for each correct bullet point</p> <ul style="list-style-type: none"> <li>NOT (A AND B) // A NAND B</li> <li>NOT the result AND C // the result NAND C</li> </ul>  <p>OR</p> 	2

Question	Answer	Marks
3(a)	<p><b>1 mark</b> for each bullet point to <b>max 3</b></p> <ul style="list-style-type: none"> <li>The microphone has a diaphragm / ribbon</li> <li>The incoming sound waves cause vibrations of the diaphragm</li> <li>... causing a coil to move past a magnet // causing a magnet to move past a coil (dynamic microphone) // changing the capacitance (condenser microphone) // deforms the crystal (crystal microphone)</li> <li>An electrical signal is produced</li> </ul>	3
3(b)(i)	<p><b>1 mark</b> for identification of star topology</p> <p><b>1 mark</b> for justification Devices are connected directly to the <u>router</u> independently // all devices are <b>only</b> connected to the <u>router</u></p>	2
3(b)(ii)	<p><b>1 mark</b> for each correct function to <b>max 3</b></p> <ul style="list-style-type: none"> <li>To receive packets from devices or the Internet</li> <li>To forward / route packets to the destination</li> <li>To find the destination of the packet</li> <li>To assign / allocate private IP addresses to devices on LAN</li> <li>To store / update / maintain a routing table</li> <li>To find the most efficient path to the destination</li> <li>To maintain a table of MAC and IP addresses</li> </ul>	3

Question	Answer	Marks
4(a)	205	1
4(b)	−51	1
4(c)	CD	1
4(d)	<b>1 mark</b> for:  The denary value in each group of 4 bits is greater than 9 // the denary value in each nibble is greater than 9	1
4(e)(i)	<b>1 mark</b> for working, <b>1 mark</b> for answer  <pre> 0011 1101 +0010 1101 ----- 0110 1010 111 1 1           </pre>	2
4(e)(ii)	<b>1 mark</b> for working, <b>1 mark</b> for answer  <pre> 0011 1101 +1101 0011 (two's complement) ----- 0001 0000 1111 111           </pre>	2

Question	Answer	Marks									
5(a)	<b>1 mark</b> for each description, <b>1 mark</b> for each valid example  <table border="1"> <thead> <tr> <th>Term</th><th>Description</th><th>Example from logo</th></tr> </thead> <tbody> <tr> <td><b>Property</b></td><td>data about the shapes // defines one aspect of the appearance of the drawing object</td><td>e.g. black line // white fill // black fill //solid (line) // font of letter // colour of triangle</td></tr> <tr> <td><b>Drawing list</b></td><td>the list of shapes involved in an image // a list that stores the command/description required to draw each object</td><td>e.g. triangle // capital letter R // rectangle // line</td></tr> </tbody> </table>	Term	Description	Example from logo	<b>Property</b>	data about the shapes // defines one aspect of the appearance of the drawing object	e.g. black line // white fill // black fill //solid (line) // font of letter // colour of triangle	<b>Drawing list</b>	the list of shapes involved in an image // a list that stores the command/description required to draw each object	e.g. triangle // capital letter R // rectangle // line	4
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Question	Answer	Marks
5(b)(i)	<p><b>1 mark</b> for each bullet point to <b>max 2</b> for each difference</p> <ul style="list-style-type: none"> <li>• Bitmap made up of pixels // bitmap is made of colours stored for individual pixels</li> <li>• Vector graphic store a set of instructions about how to draw the shape</li> <li>• When bitmap is enlarged the pixels get bigger and it pixelates</li> <li>• When vector is enlarged it is recalculated and does not pixelate</li> <li>• Bitmap files are usually bigger than vector graphics files because of the need to store data about each pixel</li> <li>• Vector graphics have smaller file size because they contain just the instructions to create the shapes</li> <li>• Bitmap images can be compressed with significant reduction in file size</li> <li>• Vector graphic images do not compress well because of little redundant data</li> </ul>	<b>4</b>
5(b)(ii)	<p><b>1 mark</b> for each bullet point to <b>max 2</b> for each method</p> <ul style="list-style-type: none"> <li>• Reduce bit depth</li> <li>• ... reduces the number of bits per colour / pixel which means each pixel has fewer bits</li> <li>• Reduce colour palette // reduce number of colours</li> <li>• ... fewer colours mean fewer bits needed to store each colour</li> <li>• Reduce image resolution</li> <li>• ... fewer pixels per unit measurement means less binary to store</li> </ul>	<b>4</b>

Question	Answer	Marks																			
6(a)(i)	<p><b>1 mark</b> for 1 tick in the correct place <b>2 marks</b> for all 3 ticks correct</p> <table><tr><th rowspan="2">Task</th><th colspan="3">Normalisation stage</th></tr><tr><th>0NF to 1NF</th><th>1NF to 2NF</th><th>2NF to 3NF</th></tr><tr><td>Remove any partial key dependencies</td><td></td><td>✓</td><td></td></tr><tr><td>Remove any repeating groups of attributes</td><td>✓</td><td></td><td></td></tr><tr><td>Remove any non-key dependencies</td><td></td><td></td><td>✓</td></tr></table>	Task	Normalisation stage			0NF to 1NF	1NF to 2NF	2NF to 3NF	Remove any partial key dependencies		✓		Remove any repeating groups of attributes	✓			Remove any non-key dependencies			✓	2
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Question	Answer	Marks
6(a)(ii)	<p><b>1 mark</b> for each correct relationship</p> <pre> graph TD     PLANT --- 1:M  PURCHASE_ITEM     CUSTOMER --- 1:M  PURCHASE     PURCHASE_ITEM --- 1:M  PURCHASE </pre>	<b>3</b>
6(b)	<p><b>1 mark</b> for description of purpose</p> <ul style="list-style-type: none"> <li>Stores metadata about the database</li> </ul> <p><b>1 mark</b> for each example of contents to <b>max 2</b></p> <p>e.g.</p> <ul style="list-style-type: none"> <li>field / attribute names</li> <li>table name</li> <li>validation rules</li> <li>data types</li> <li>primary keys // foreign keys</li> <li>relationships</li> </ul>	<b>3</b>
6(c)(i)	<p><b>1 mark</b> for each correctly completed space</p> <pre> SELECT SUM(Quantity) FROM PURCHASE_ITEM WHERE PurchaseID = "3011A"; </pre>	<b>4</b>
6(c)(ii)	<p><b>1 mark</b> per bullet point</p> <ul style="list-style-type: none"> <li>ALTER TABLE PURCHASE</li> <li>ADD OrderDate</li> <li>Suitable data type, e.g. DATE</li> </ul> <pre> ALTER TABLE PURCHASE ADD OrderDate DATE; </pre>	<b>3</b>

Question	Answer	Marks																					
7(a)	<p><b>1 mark</b> per pair of rows (shaded &amp; unshaded)</p> <table> <tr> <th>Event</th><th>Hardware Interrupt</th><th>Software Interrupt</th></tr> <tr> <td>Buffer full</td><td></td><td>✓</td></tr> <tr> <td>Printer is out of paper</td><td>✓</td><td></td></tr> <tr> <td>User has pressed a key on the keyboard</td><td>✓</td><td></td></tr> <tr> <td>Division by zero</td><td></td><td>✓</td></tr> <tr> <td>Power failure</td><td>✓</td><td></td></tr> <tr> <td>Stack overflow</td><td></td><td>✓</td></tr> </table>	Event	Hardware Interrupt	Software Interrupt	Buffer full		✓	Printer is out of paper	✓		User has pressed a key on the keyboard	✓		Division by zero		✓	Power failure	✓		Stack overflow		✓	3
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7(b)	<p><b>1 mark</b> for each bullet point to <b>max 4</b></p> <ul style="list-style-type: none"> <li>Storage space is divided into file allocation units</li> <li>Space is allocated to particular files</li> <li>Maintains / creates directory structures</li> <li>Specifies the logical method of file storage (e.g. FAT or NTFS)</li> <li>Provides file naming conventions</li> <li>Controls access // implements access rights // implements password protection // Makes file sharing possible</li> <li>Specifies tasks that can be performed on a file (e.g. open, close, delete, copy, create, move etc.)</li> </ul>	4																					
7(c)	<p><b>1 mark</b> for identifying program <b>1 mark</b> for description, <b>max 2</b> per program e.g.</p> <ul style="list-style-type: none"> <li>Defragmentation</li> <li>Less time is taken to access files because each one is contiguous so there is less head movement</li> <li>Virus checker</li> <li>makes more RAM available for programs to run</li> <li>... because it removes software that might be taking up memory / replicating</li> <li>Disk repair / Disk contents analysis</li> <li>preventing bad sectors being used because it identifies / marks them</li> <li>reduces access times by optimising storage</li> <li>Disk/system clean up</li> <li>releases storage by removing unwanted / temporary files</li> </ul>	4																					

Question	Answer	Marks															
8(a)(i)	<p><b>1 mark</b> for each bullet point to <b>max 2</b> for each register</p> <p><b>MAR</b></p> <ul style="list-style-type: none"><li>• Stores the next <u>address</u> to be fetched</li><li>• ... held in the Program Counter (PC)</li><li>• The data at this address is then fetched</li></ul> <p><b>MDR</b></p> <ul style="list-style-type: none"><li>• Stores the data from the address pointed to by the MAR</li><li>• The data in it is copied to the Current Instruction Register (CIR)</li></ul>	4															
8(a)(ii)	<p><b>1 mark</b> for a correct register</p> <p>e.g.</p> <p>Program Counter (PC)</p> <p>Current Instruction Register (CIR)</p> <p>Status register</p> <p>Interrupt register</p>	1															
8(b)(i)	<p><b>1 mark</b> for each correct answer</p> <table><tr><th>Current contents of the ACC</th><th>Instruction</th><th>New contents of the ACC</th></tr><tr><td>01010101</td><td>XOR 101</td><td>1010 0101</td></tr><tr><td>11110000</td><td>AND 104</td><td>1111 0000</td></tr><tr><td>00001111</td><td>LSL #4</td><td>1111 0000</td></tr><tr><td>11111111</td><td>OR 102</td><td>1111 1111</td></tr></table>	Current contents of the ACC	Instruction	New contents of the ACC	01010101	XOR 101	1010 0101	11110000	AND 104	1111 0000	00001111	LSL #4	1111 0000	11111111	OR 102	1111 1111	4
Current contents of the ACC	Instruction	New contents of the ACC															
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00001111	LSL #4	1111 0000															
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8(b)(ii)	<p><b>1 mark</b> for each correct instruction</p> <table><tr><th>Instruction Group</th><th>Instruction</th></tr><tr><td>Data movement</td><td>LDM #2</td></tr><tr><td>Input and output of data</td><td>IN / OUT</td></tr><tr><td>Arithmetic Operations</td><td>INC ACC / INC IX</td></tr><tr><td>Unconditional and conditional instructions</td><td>JPN 100 / JMP 100</td></tr><tr><td>Compare instructions</td><td>CMP 100</td></tr></table>	Instruction Group	Instruction	Data movement	LDM #2	Input and output of data	IN / OUT	Arithmetic Operations	INC ACC / INC IX	Unconditional and conditional instructions	JPN 100 / JMP 100	Compare instructions	CMP 100	4			
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8(b)(iii)	<p><b>1 mark</b> for name, <b>1 mark</b> for description</p> <ul style="list-style-type: none"> <li>• Indirect addressing</li> <li>• the address to be used is at the given address</li> <li>• Relative addressing</li> <li>• the address to be used is an offset number of locations away, relative to the address of the current instruction</li> <li>• Indexed addressing</li> <li>• form the address from the given address plus the contents of the index register</li> </ul>	<b>2</b>