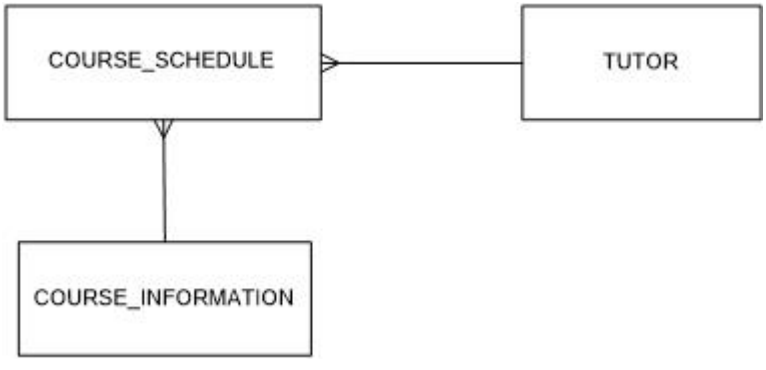
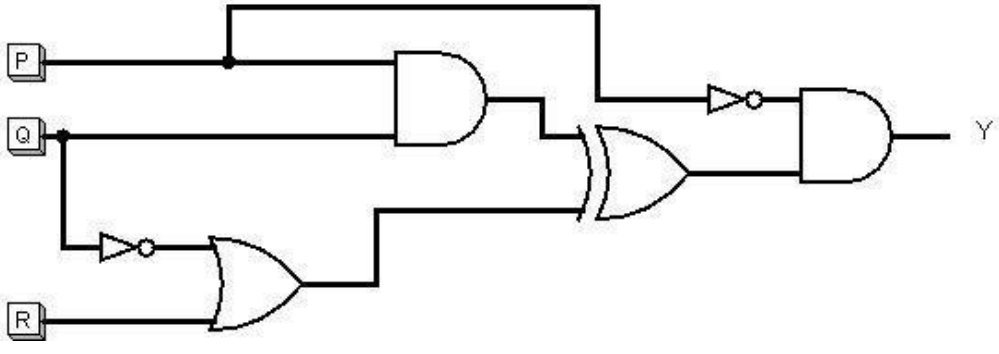
Question	Answer	Marks
1(a)	**1 mark** for: • data values that are continuously changing // variable // any value	**1**
1(b)	**1 mark** for 1 correct line **2 marks** for 3 correct lines **Term** / **Description** sampling → the number of samples taken per second sampling rate → taking measurements at regular intervals and storing the values sampling resolution → the number of bits used to store each sample	**2**

Question	Answer	Marks
2(a)	**1 mark** for each bullet point: • more pixels can be stored / are available • the image is sharper / less pixelated	**2**
2(b)	**1 mark** for answer. **1 mark** for working Answer: 4096 kibibytes Working: File size = (2048 × 1024 × 16) / (8 × 1024)	**2**

Question	Answer	Marks
3(a)(i)	**1 mark** for each bullet point (**max 2**). • Courses must be available to anyone who wishes to follow them • Courses must be available on the internet • Company is willing to share infrastructure with other companies (public) • …which is more economic for the company	**2**
3(a)(ii)	**1 mark** for each bullet point (**max 2** for each disadvantage). • There could be a possible loss of control unlike the LAN • …because the data is stored on a remote infrastructure / someone else's infrastructure • …reliance on external agency to complete tasks, e.g. backups, security • Requires reliable internet connection • …to ensure access to the remote data, more likely with LAN • Increased recurring costs • ...as cloud provider charges must be paid, costs for LAN once only.	**4**
3(a)(iii)	**1 mark** each for firewall, encryption and passwords. Firewall: • Monitors incoming and outgoing traffic and rejects any traffic that does not meet the set rules Encryption: • Ensures that if data is intercepted / obtained it cannot be understood without the decryption key Passwords: • Ensures only users with the correct password can access the resources // prevents unauthorised access	**3**
3(b)(i)	**1 mark** for both 1:M relationships as follows:  	**1**

Question	Answer	Marks
3(b)(ii)	**1 mark** for each bullet point. • `SELECT Count(CourseID)` • `AS NumOfCourses` • `FROM COURSE_SCHEDULE` • `WHERE DateStarted > "09/09/23";` `SELECT Count(CourseID) AS NumOfCourses FROM COURSE_SCHEDULE WHERE DateStarted > "09/09/23";`	**4**
3(c)	**1 mark** for each bullet point. • The administrator completes a visual check / checks by eye • …that the tutor identifier input matches the tutor identifier on the **original** document • Double entry check // the administrator (or a second person) enters the number a second time • …and the **system** compares it with the first entry	**4**

Question	Answer	Marks
4(a)	**1 mark** for each set of highlighted rows 	P	Q	R	Y
---	---	---	---
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0		**2**
4(b)	**1 mark** for **P** AND **Q** and NOT **Q** OR **R** **1 mark** for NOT gate and AND gate and XOR gate  	**2**

Question	Answer	Marks
5(a)	**1 mark** for each bullet point (**max 2** for each feature). Context-sensitive prompts: • As the code is being written • …the options to complete the statement are shown Single stepping: • allows the programmer to execute the program one line at a time • …so that the effects of each statement can be seen	**4**
5(b)(i)	**1 mark** for each bullet point (**max 2**). • To reduce the time it takes to download the program files from the web server // to upload them to the server in the first place • To reduce the amount of storage space used on the web server // user's device	**2**
5(b)(ii)	**1 mark** for each bullet point (**max 3**). • Disk needs to be prepared for initial use • Disk needs to be checked for errors • A new file system needs to be generated on the disk • The file allocation table needs to be set up	**3**

Question	Answer	Marks
6(a)	**1 mark** for each bullet point (**max 2**). • Users are able to trial the program and may offer the programmer constructive **feedback** • **More people** might try the program because the trial is free of charge • Allows bugs to be found and corrected on a wide range of computer system configurations improving the programmer's original program • Users that find the trial useful will buy the program so programmer gets **income** • Allows the program to be **copyrighted** and so protects the programmer's intellectual property rights // no **illegal** modification allowed	**2**

Question	Answer	Marks
6(b)	**1 mark** for each bullet point (**max 4**). • The programmer has ethical guidelines to follow • …so purchasers of programs know the standards being applied • …so programmer does not have to decide what is ethical or not • Clients know programmer is reputable • …recognition of programmer's skills/knowledge • There may be an entry requirement / exam • … so clients know that the programmer is competent • Professional ethical body provides help and support • Such as legal advice // by appropriate example • Enables programmer to attend the ethical body's training courses • …to keep skills up to date // to develop skills	**4**

Question	Answer	Marks
7(a)	**1 mark** for each bullet point (**max 2**). • Static RAM has faster access time • …because it does not need to be refreshed • …used on the CPU for improvement of CPU cache speed • Static RAM has lower	**2**
7(b)	**1 mark** for each bullet point (**max 2**) • EEPROM allows frequent / multiple read / write / erase operations • …which means that the contents of the firmware in the headset can be changed easily • …without fully erasing the contents of the firmware in the headset first	**2**
7(c)	**1 mark** for each bullet point (**max 4**) • The print instructions and data are sent by the laptop to a buffer (at laptop speed) • The data is transferred from the buffer to the printer (at printer speed) • …allowing user to continue using the laptop // and allowing processor to continue processing • …instead of waiting for relatively slower printer • When the buffer is empty an interrupt is sent to the laptop • …requesting more data	**4**

Question	Answer	Marks
7(d)	**1 mark** for naming a correct port **2 marks** for matching justification • USB • …has fast data transfer speeds for data (to the headset) • …is a universal/popular cable // universal standard • HDMI • …allows video and audio to be transferred (on the same cable) • …convenience of HDMI as no need for two cables	**3**

Question	Answer	Marks
8(a)	**1 mark** for each bullet point (**max 2**) • Validation // a validation method named or described • …protects the data by ensuring that the data is reasonable / sensible and within specified bounds	**2**
8(b)	**1 mark** for difference **1 mark** for similarity Difference: • Pharming is malicious code that redirects to a **fake website**. Phishing uses an **email** to prompt user action. • Pharming is **automatic**. Phishing requires **user action**. Similarity: • Both try to obtain financial or personal information • Both are a false representation of an official organisation, e.g. a bank • Both make use of fake websites	**2**

Question	Answer	Marks
8(c)	**1 mark** for each bullet point (**max 3**). • Download programs from reputable websites / sources • …as these are less likely to contain malware • Backup / archive computer systems • …so they can be restored in case of data loss from malware program installation • **Install and run** anti-malware program • …so that regular scans can be made for known malware • …and if malware is found it can be quarantined / removed • …and computer's anti-malware definitions are regularly updated • Using a firewall to block unused ports • …so that malware cannot enter the computer system • Deny administrator privileges to everyday users • …so that malware cannot be downloaded by everyday users • Avoid the use of / access to removable devices • …so that malware cannot be installed from these devices	**3**

Question	Answer	Marks
9(a)(i)	**1 mark** for each bullet point (**max 3**). • Control unit (CU) • Arithmetic **and** Logic Unit (ALU) • Immediate Access Store (IAS) • (System clock)	**3**
9(a)(ii)	**1 mark** for each bullet point (**max 2**). • Special purpose registers hold the status of a program whereas general purpose registers hold the temporary data while performing operations. • Special purpose registers are specialised for a specific use, whereas general purpose registers are used for any purpose. • General purpose registers can be used by most instructions, whereas special purpose can only be used by certain instruction	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9(b)</td><td>1 mark for each correct answer (shaded cells)

<table>
<tr><th>Step</th><th>Description</th></tr>
<tr><td>PC ← [PC] + 1</td><td>The address in PC is incremented.</td></tr>
<tr><td>MDR ← [[MAR]]</td><td>The data in the location pointed to by the MAR is copied to the MDR.</td></tr>
<tr><td>MAR ← [PC]</td><td>The contents of PC are copied to the MAR.</td></tr>
<tr><td>CIR ← [MDR]</td><td>The contents of MDR are copied into CIR.</td></tr>
</table>
</td><td>4</td></tr>
<tr><td>9(c)</td><td>1 mark for an appropriate example.

Examples:
• Division by zero
• Runtime error
• Out of memory bounds
• Program requesting an external device / input
• Buffer overflow</td><td>1</td></tr>
<tr><td>9(d)</td><td>1 mark for each letter in the correct position (2, 4 and 6)

D
A
B</td><td>3</td></tr>
</table>