Answer all questions.

1. Mary plans to build a wireless network for a movie exhibition so that visitors can register as members, purchase tickets and watch videos.

(a) (i) Describe the characteristics of the network protocols, TCP and UDP.

TCP: Faster internet connection

UDP: More stable connection.

(2 marks)

(ii) Tick an appropriate network protocol for each activity below:

Activity	Protocol	
	TCP	UDP
1. Video streaming	☑	☐
2. Ticket purchasing	☐	☑
3. Member registration	☑	☐

(2 marks)

(b) Below are the tasks of a test plan for the network.

Task	Description
1	Set up a testing environment.
2	Define the requirements of the network testing.
3	Record the test results.
4	Choose suitable tools for testing such as PING.
5	Run the test multiple times and compare the results to verify the consistency and validity of data.

(i) Fill in the task numbers in the correct order below.

(1) → (2) → (4) → (5) → 3

(2 marks)

(ii) Which **two** tasks should be done by a network administrator? Explain briefly.

Task 4 and 5, as this need people who know about network to do.

(2 marks)

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(iii) Other than network connectivity, suggest **two** performance indicators of network testing.

Connection speed and can perfect getting all testing result.

(2 marks)

(c) Mary uses PING to test the network connectivity.

(i) Mary finds that testing with IP addresses returns successful connections, but not with domain names. What is the possible reason for this?

Because it still not have a name

(1 mark)

(ii) Give **two** pieces of information returned by PING.

Connection speed and IP address.

(2 marks)

(d) Mary drafts the 'Terms of use' for connecting to the visitors' wireless network. Suggest **two** terms of use related to the use of the network.

Privacy and copyright. to the use of network.

(2 marks)

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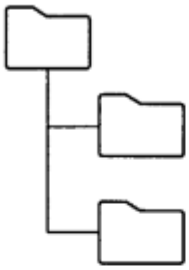
2. Amy builds a network for an information system in a nursing home. Elders wear a wireless device with sensors that collect their locational data and health-related data.

(a) In the network, clerks and nurses can access the following folders in the file server.



Folder P (Sensor data)

Folder Q (Health reports)

Amy sets the following requirements:

- Clerks can read data in Folder P but cannot modify it.
- Nurses can read data and store new data in Folder P.
- Clerks can store reports in Folder Q but cannot read the reports in Folder Q.
- Nurses can read and add comments in the reports in Folder Q.

Complete the permission settings for the folders below. Use '✓' and '×' to represent 'yes' and 'no' respectively.

Folder	Nurse		Clerk	
	Read	Write	Read	Write
P	✓	✓	✓	×
Q	✓	✓	×	✓

(3 marks)

(b) The system periodically collects data from the wireless devices to locate the position of elders.

(i) Which transmission method, synchronous transmission or asynchronous transmission, should be used? Justify your answer.

Asynchronous tramission, as it have a higher security level.

(2 marks)

(ii) Which mode, half duplex mode or full duplex mode, should be used? Justify your answer.

Half duplex mode, as some information are blocked for clerk.

(2 marks)

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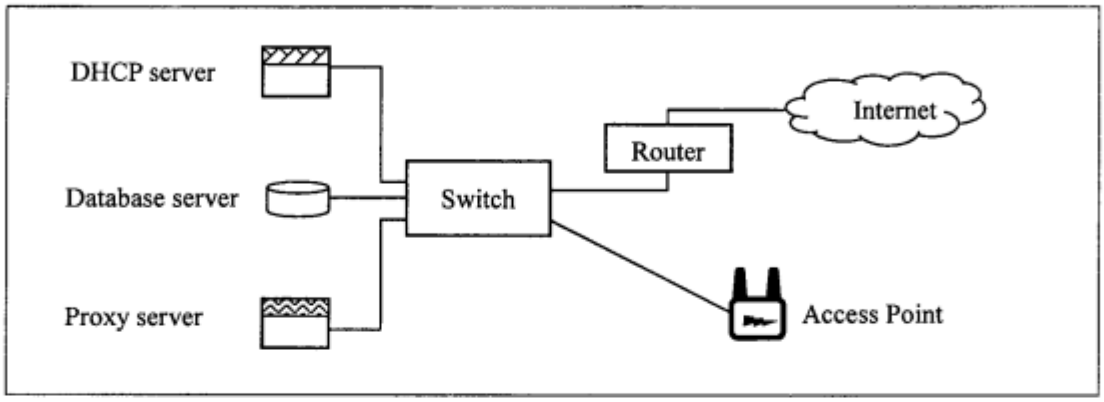
(c) Amy proposes the network diagram below.



(i) Give **two** benefits of using a DHCP server for the nursing home.

She can get the information at home also and higher security level.

(2 marks)

(ii) Give **two** benefits of using a proxy server in the network.

Faster data transfer and high security level.

(2 marks)

(iii) Amy plans to use RAID for the database server. Give **two** benefits of her plan.

It can save more data in the server and having a high transmission speed.

(2 marks)

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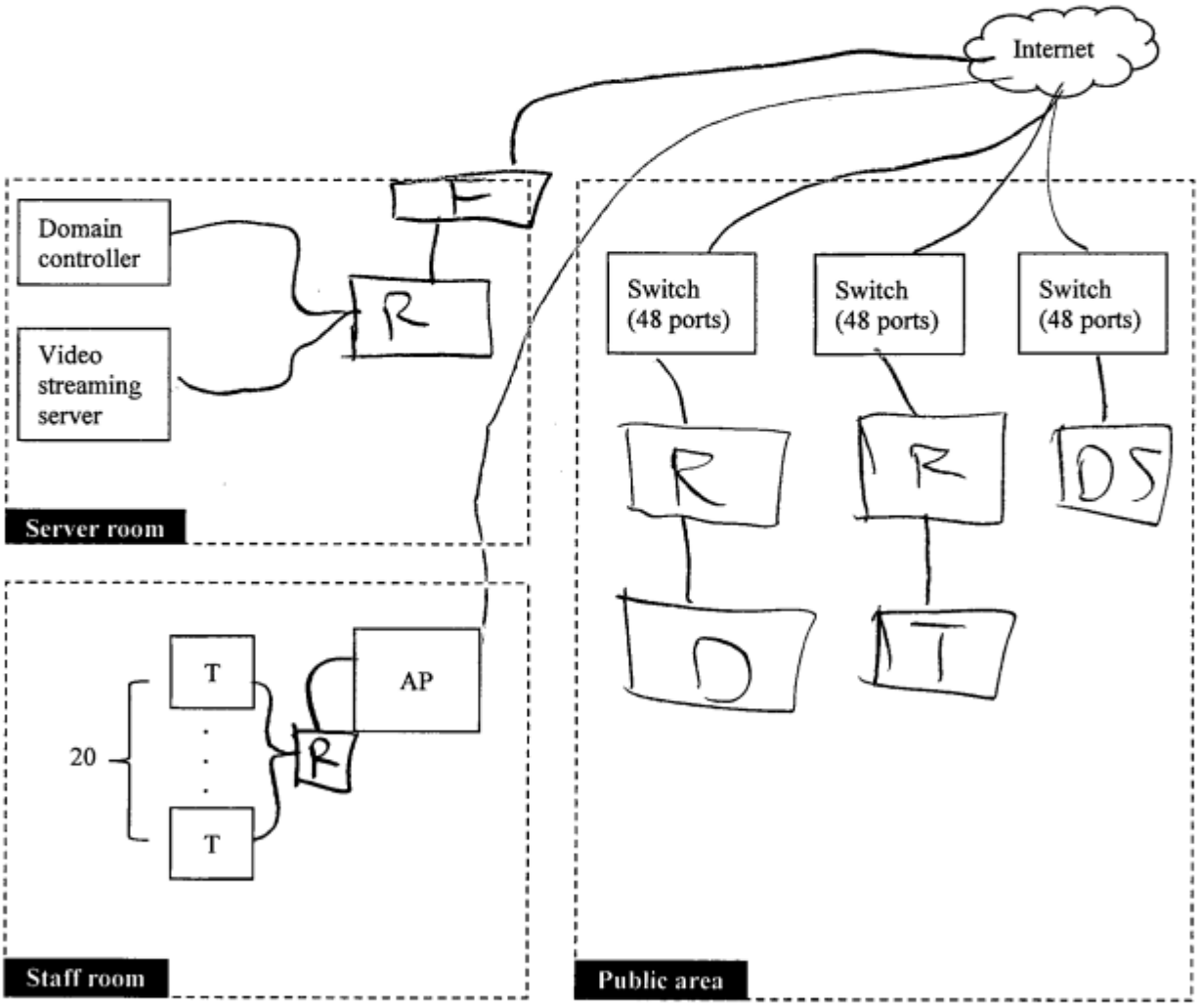
3. Tom builds a network in a library for staff and visitors to use. The network includes an Access Point (AP), a firewall, a 5-port router and a database server. The network should support the network connections for the following devices:

Staff room: 20 wireless tablet computers
Public area: 100 wired desktop computers

(a) Complete the network design of the library by drawing the necessary network connecting devices and cable connections below. Use the following symbols to represent the relevant network components:

T	Tablet computer	D	Desktop computer
R	Router	DS	Database server
F	Firewall	———	Cable

(6 marks)



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(b) Describe **two** uses of the domain controller in the network.

- Gives security and control of the network.

(2 marks)

(c) Tom plans to install an Uninterruptible Power Supply (UPS) to support a device in the network.

(i) Give **two** advantages of this plan.

Cheaper and safety.

(2 marks)

(ii) To which device in the network should the UPS be connected? Justify your answer.

Domain controller, it give power supply to the controller makes it can have a long time domain control.

(2 marks)

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(d) Tom plans to build subnets for the zones below:

Zone	Number of devices
Staff room	20
Public area	100

(i) Give **two** technical benefits of using subnets.

It can provide to many people and it is cheap.

(2 marks)

(ii) Complete the network setting below.

Zone	IP address range		Subnet mask	Broadcast address
	From	To		
Staff room	192.168.1.1	192.168.1.254	255.255.255.128	192.168.1.1
Public area	192.168.1.129	192.168.1.254	255.255.255.255	192.168.1.254

(4 marks)

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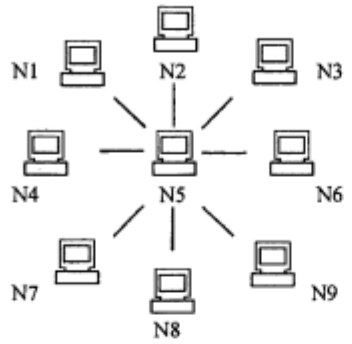
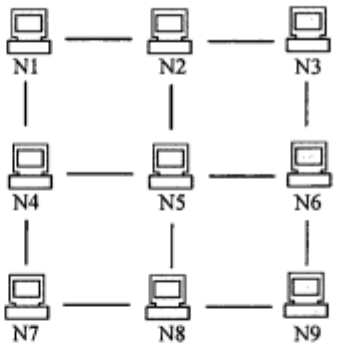
4. Danny considers using one of the following two network designs to build up a peer-to-peer network of nine computers, N1, N2, …, N9.



Design A



Design B

(a) (i) Complete the table below.

Design	Scenario	Can N1 and N9 communicate with each other? (Yes / No)
A	N5 is shut down.	No
B	N5 and N6 are shut down.	Yes

(2 marks)

(ii) State **two** advantages of Design B over Design A.

They can send to who they want to send. even some computer are shut down, and the data will be save by more computer so it is hard to get lost those data.

(2 marks)

(b) Danny decides to use fibre optics instead of UTP cables as the transmission medium. Give **three** technical reasons to support his decision.

Fibre optics have the fastest transmission speed, longest cables length and won't effected by other devices.

(3 marks)

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Danny uses even parity check for the data transmission over the network. Below is an example.

Data							Parity bit
0	1	0	0	1	0	1	1

(c) Fill in the parity bits of the data below.

Data							Parity bit
1	0	0	0	0	0	1	0
0	0	1	0	0	1	1	1
0	0	0	1	1	0	1	1
0	0	1	1	0	1	1	1

(2 marks)

(d) Below is the data to be sent.

Data							Parity bit
0	1	0	1	1	0	1	0

However, in the following two cases, the parity bits cannot help detect the errors in the data received. Complete the data below.

Error case 1:

Data							Parity bit
0	1	0	1	0	1	0	0

Error case 2:

Data							Parity bit
0	1	1	1	0	1	1	0

(2 marks)

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(e) Danny adopts an error detection method with row parity bits and column parity bits, using even parity check, as shown in the example below. A row parity bit is the parity bit for the vertical bits while a column parity bit is the parity bit for the horizonal bits.

	Data							Column parity bit
	0	0	0	0	1	0	1	0
	0	0	0	0	0	1	0	1
	0	0	0	1	0	1	1	1
	1	1	1	0	1	0	0	0
Row parity bit	1	1	1	1	0	0	0	

(i) Write the row parity bits of the data below.

	Data							Column parity bit
	0	1	0	0	0	0	1	0
	0	1	0	0	0	1	1	1
	0	1	0	0	1	1	1	0
	0	1	0	1	1	1	1	1
Row parity bit	0	1	1	1	1	1	1	

(1 mark)

(ii) The data below contains an error bit. Circle the error bit.

	Data							Column parity bit
	1	1	0	0	0	0	0	0
	0	1	1	0	0	1	0	1
	1	0	0	0	1	0	0	1
	1	1	0	1	0	1	0	0
Row parity bit	1	1	1	1	1	0	1	

(2 marks)

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