9.4 TCP IP part 1

Name: _____

Class: _____

Date: _____

Time: **350 minutes**

Marks: **269 marks**

Comments:

Q1.

Employees at a bank use client computers to access data that is stored on a database server.

The database server uses software to query and modify data stored in a database on hard disk drives. It returns the results of these queries to the clients over the bank's computer network.

The performance of the system is unsatisfactory: the time-delay between a client sending a query to the server and the client receiving the results is unacceptably long.

Explain how the performance of the system might be improved. You should consider the following factors that might be affecting the performance:

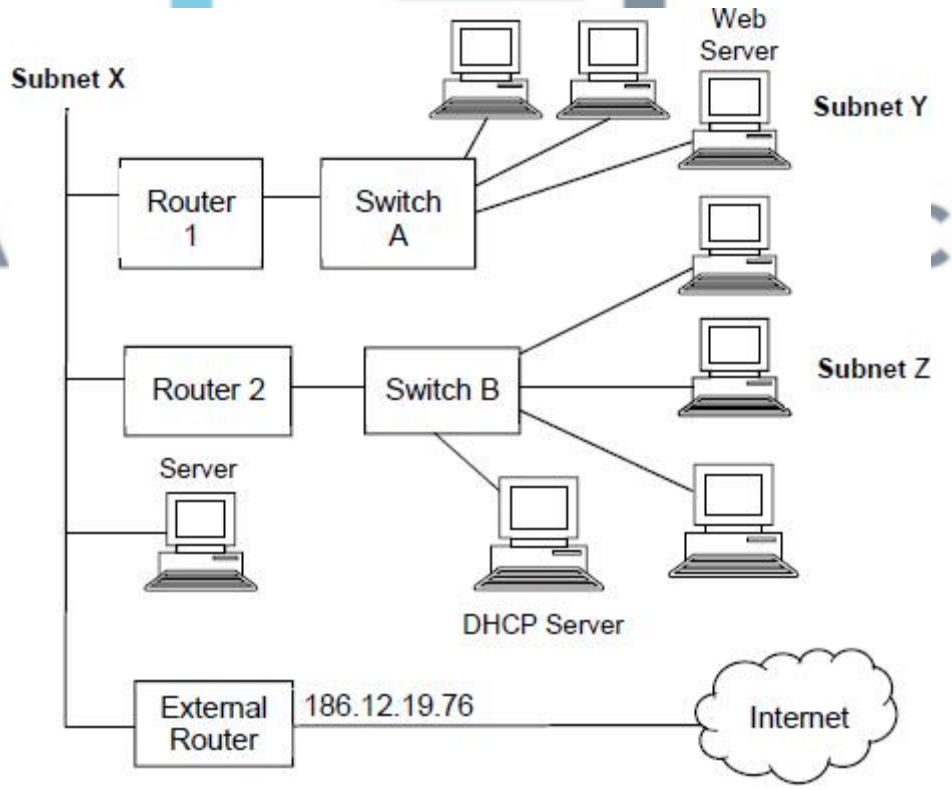
- the hardware of the server
- the design of the computer network
- the database and software running on the server.

In your answer you will be assessed on your ability to follow a line of reasoning to produce a coherent, relevant and structured response.

(Total 12 marks)

Q2.

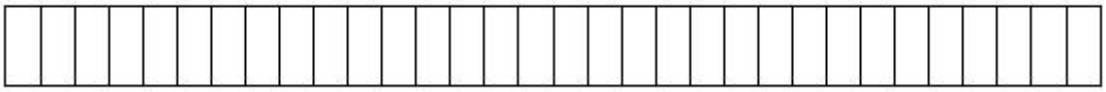
The diagram shows the physical topology of a local area network (LAN) used by a company, and its connection to the Internet. The LAN uses the IPv4 protocol.



Internally, the network has been divided into subnets: 27 bits have been allocated to the network / subnet identifier.

(a) In binary, write out the subnet mask that has been programmed into the devices on

the network.



(1)

(b) **Subnet Z** consists of all of the devices that are directly connected to Switch B.

What is the maximum number of devices that could be connected to **Subnet Z** at the same time?

_____

_____

(1)

(c) When a device wishes to join **Subnet Z** it communicates with the DHCP server.

Explain:

- the purpose of the DHCP system
- why the DHCP system is used
- what will happen during this communication.

_____

_____

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_____

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_____

_____

(4)

(Total 6 marks)

Q3.

The web server, which has the IP address 192.168.16.12, must be accessible from computers that are connected to the Internet but outside the company's own network.

As the web server has a non-routable IP address, it cannot be accessed directly from outside the network. Therefore, access to the web server will be facilitated by the External Router, which supports Network Address Translation (NAT) and port forwarding.

Explain how the External Router will have been configured so that the web server can be accessed by computers outside the network.

_____

_____

_____

_____

_____

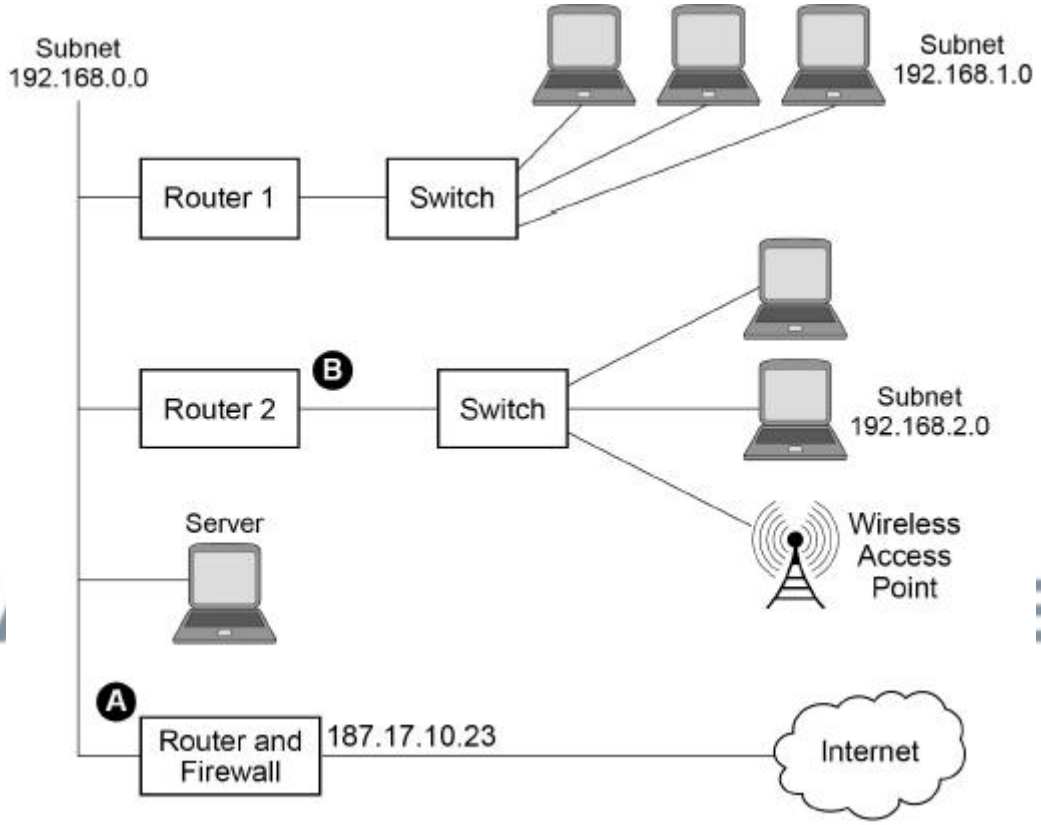
_____

(Total 2 marks)

Q4.

Figure 1 shows the physical topology of a local area network (LAN) and its connection to the Internet. The LAN uses the IPv4 protocol.

Figure 1



State suitable IP addresses for:

The 'Router and Firewall' port labelled A _____

The 'Router 2' port labelled B _____

(Total 2 marks)

Q5.

A web browser is used to access the World Wide Web.

Web pages can be retrieved from a web server using either the HTTP or the HTTPS protocol.

(a) What does HTTP stand for?

_____

(1)

(a) State **one** difference between HTTP and HTTPS.

_____

_____

(1)

(Total 2 marks)

Q6.

A computer that retrieves a web page from a web server is known as a client.

Identify the TCP/IP layer that is concerned with ports and explain how a client port and a well-known port are used when retrieving a web page.

_____

_____

_____

_____

_____

_____

_____

(Total 3 marks)

Q7.

Put **one** tick (✔) on each row of the table below to classify each row as either a URL, a domain name, an IP address, a socket address or a protocol.

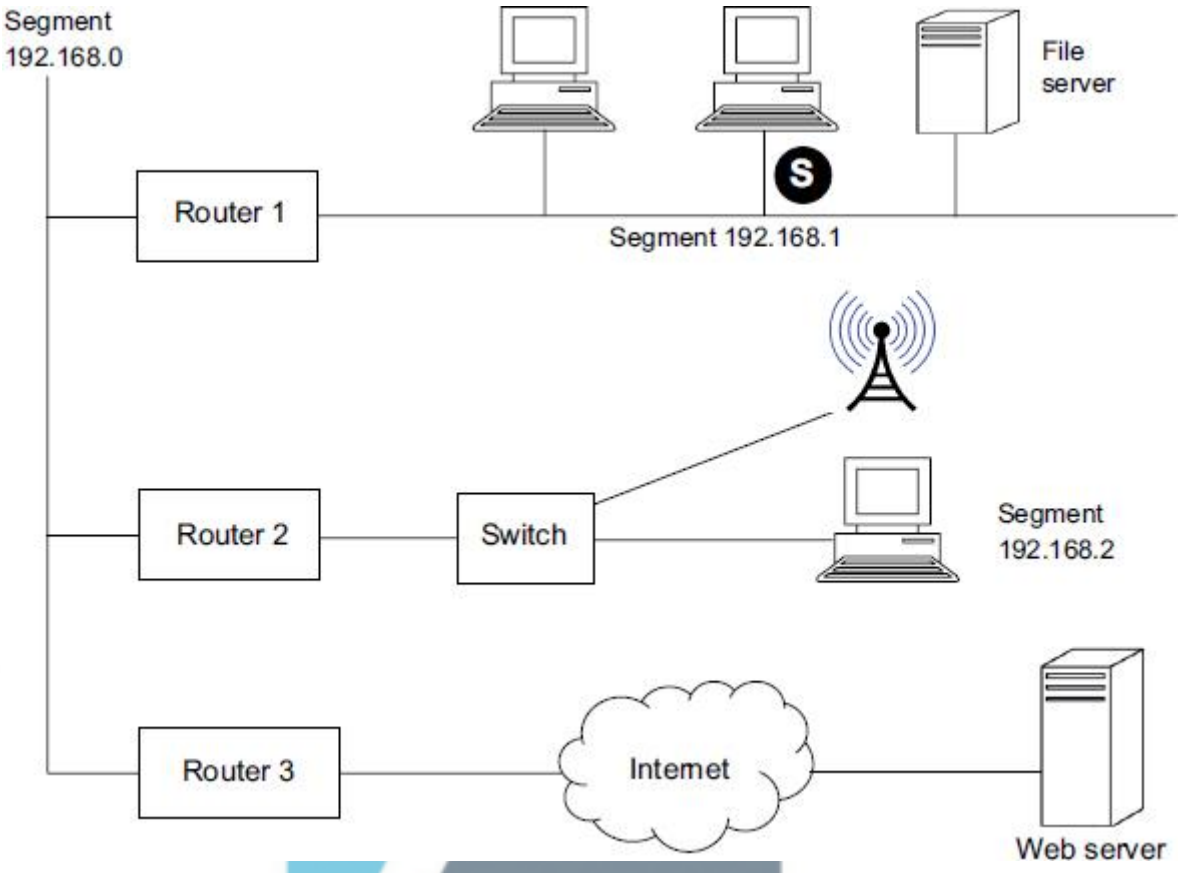
	URL	Domain name	IP address	Socket address	Protocol
Telnet					
192.168.10.23:80					
http://www.bbc.co.uk					

(Total 2 marks)

Q8.

A student is using her computer at school.

The diagram shows the physical topology of the Local Area Network (LAN) to which her computer is connected. The LAN is divided up into segments. It also shows a web server that her computer connects to through the Internet. The student is using the computer labelled S.



Write a detailed description of how one packet of data that the student is uploading to the web server will be routed from her computer in the UK to the web server that is located in Chicago in the USA. You may assume that the web browser software on the student's computer has already used a domain name server to look up the IP address of the web server.

Your description should cover:

- how the packet will be routed within the LAN from the student's computer to the router (Router 3) that links the LAN to the Internet **and**
- how the packet will be routed to the web server once the packet is on the Internet.

In your answer you will be assessed on your ability to use good English, and to organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

(Total 8 marks)

Q9.

A systems analyst is planning a system for the administration of student courses to be used in an office in a college. The system must allow users at ten workstations to access and update a central database.

(a) The analyst initially plans to use either a server-based or a peer-to-peer network.

Explain why a server-based network is likely to be more appropriate than a

peer-to-peer network in this situation.

(2)

(b) After considering other alternatives, the analyst finally decides to use a thin-client network.

Explain how a thin-client network works and how the use of a thin-client network instead of a traditional rich-client (thick-client) network will affect the selection of the hardware to be used by the system.

(6)

(c) The system will be networked within the college. This network will then be connected to the Internet so that staff who are away from the college can log in and access the system. This connection has to use a gateway.

Why must the college use a gateway instead of a router to connect their network to the Internet?

_____

_____

_____

(1)

(Total 9 marks)

Q10.

The configuration file for a school's firewall contains the following three rules:

Rule 1	ACCEPT	80.1.12.100:22	[SSH]
Rule 2	ACCEPT	* . * . * . * :80	[HTTP]
Rule 3	DENY	* . * . * . * :23	[TELNET]

* represents all numbers from 0 - 255

(a) Explain what is meant by an IP address.

_____

_____

(1)

(b) (i) SSH, HTTP and Telnet are all protocols.

State what is meant by the term protocol.

_____

_____

(1)

(ii) Explain why the school has set up the firewall so that HTTP requests are accepted from any IP address but Telnet requests are denied.

_____

_____

_____

_____

_____

_____

(2)

(c) David is a company's network manager who is away travelling for his summer holiday. Whilst he is on holiday, a security update is released for a critical piece of

software running on one of his company's servers. The update can be downloaded from the FTP server at URL ftp.aqaservertools.com for which David has a username and password.

David has a laptop which has a telnet client and an FTP client installed on it.

On the company server, David has access to a Telnet server, an FTP server and an FTP client.

The figure below shows the situation.

Laptop	Security update server	Company server
IP: 12.23.56.78	ftp.aqaservertools.com	IP: 80.56.34.12
Telnet client FTP client	FTP server	Telnet server FTP client FTP server

David uses his laptop to connect to a local wireless access point.

Explain what is meant by the client server-model and describe the steps David would go through to apply the security update to the company's server.

In your answer you will be assessed on your ability to use good English and to organise your answer clearly in complete sentences using specialist vocabulary where appropriate.

(6)

(Total 10 marks)

Q11.

Rich client (thick client), thin client and Software as a Service (SaaS) are three methods that can be used to make software applications available to the users of computers that are connected to a network.

- Explain how rich client and thin client systems work.
- Describe the different hardware requirements of rich client and thin client systems.
- Explain why Software as a Service can be considered to be a special type of thin client system, and what distinguishes it from other types of thin client systems.

In your answer you will be assessed on your ability to use good English, and to organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

(Total 8 marks)

Q12.

(a) **Figure 1** and **Figure 2** show two screenshots: identify the protocols being used in each.

Figure 1

```
1) **** NEW CONNECTION (127.0.0.1)
1) C --> HELO tarzan.synametrics.com
1) S <-- 250 localhost. Please to meet you
1) C --> MAIL FROM:<asdf>
1) S <-- 250 OK
1) C --> RCPT TO:<asdf@fas.com>
1) S <-- 250 OK
1) C --> DATA
1) S <-- 250 Message queued for delivery.
1) C --> QUIT
1) S <-- 221 Connection successfully closed
1) **** CONNECTION TERMINATED in 150ms.
```


Protocol _____

Figure 2

```
admin@moodle.someschool.org's password:
Last login: Mon Feb 10 17:04:17 2014 from cpc4-warw15-2-
0.cable.virginm.net
[admin@torvalds ~]$ ls
       Desktop
       drupal                  test
       httpd.log               xibo-server.tar.gz
       mysqldump.sql
[admin@torvalds ~] unzip xibo-server.tar.gz
[admin@torvalds ~] reboot
```

Protocol _____

(2)

Figure 3 below shows part of the result of running a traceroute command on the URL http://www.computingatschool.org.uk

Figure 3

```
traceroute to http://www.computingatschool.org.uk (129.12.3.236), 64
hops max
1  10.0.1.1 (10.0.1.1) 2.352ms 1.572ms 3.359ms
2  cpc4-warw15-2-0-gw.3-2.cable.virginm.net (81.111.110.1) 12.619ms
12.300ms 10.466ms
3  brhm-core-2b.network.virginmedia.net (213.105.114.89) 12.807ms
11.505ms 16.987ms
4  brhm-bb-1b.network.virginmedia.net (62.253.174.77) 16.039ms
11.434ms 11.354ms
```

(b) What does URL stand for?

_____

(1)

(c) State an IP address that appears in **Figure 3**.

_____

_____

(1)

(d) The traceroute command shows the 'hops' taken to get from a computer to the requested address. Each hop identifies a router on the Internet.

Explain why traceroute might show different hops when run a second time with the same destination address.

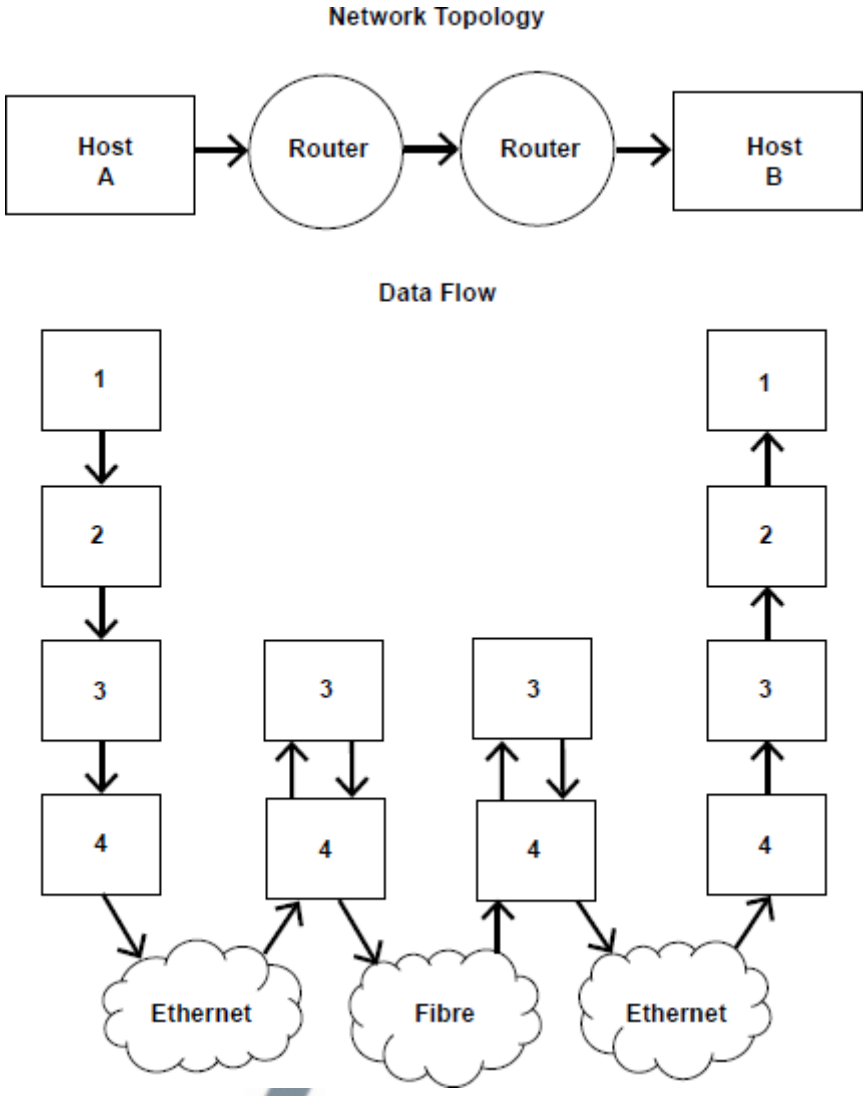
_____

_____

(1)

Figure 4 shows the layers in the TCP / IP stack.

Figure 4



(e) Complete the table below by naming the TCP / IP layers used in **Figure 4** above.

	Layer
1	
2	
3	
4	

(2)

(f) **Figure 4** shows how a packet travels from **Host A** to **Host B** through two routers.

Describe, for a packet, the role of the two lower levels of the TCP / IP stack in the router.

_____

_____

_____

_____

_____

_____

(2)

(Total 9 marks)

Q13.

A student is configuring the Local Area Network (LAN) at her home.

The following five hardware devices are connected to the network:

❶ a Combined Device that includes a wireless access point, switch, firewall, router and ADSL modem for connection to the telephone network

❷ a desktop computer that is connected to the network by cable

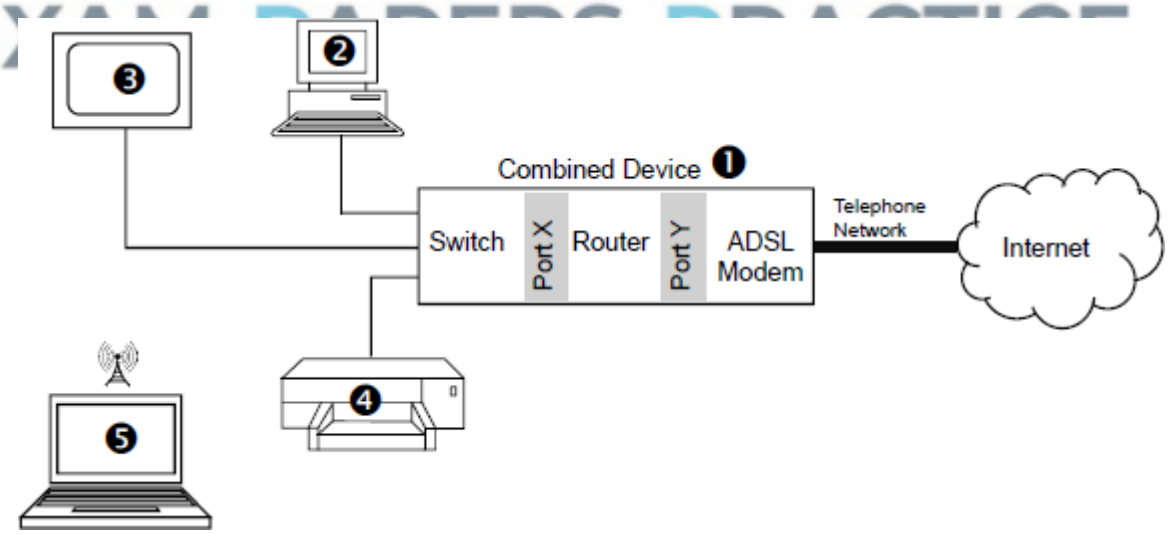
❸ a smart TV that is connected to the network by cable

❹ a printer that is connected to the network by cable

❺ a laptop computer that can connect to the network wirelessly.

The diagram below shows the physical topology of the LAN and its connection to the Internet.

Some, but not all, of the components of the Combined Device are shown.



- **Port Y** of the router in the Combined Device has the IP address 82.73.12.9.
- The network adapter card in the desktop computer has been allocated the IP address 192.168.0.2.
- The subnet mask 255.255.255.0 has been programmed into devices ❷ to ❺

(a) **Port X** is the router port, within the Combined Device, that allows devices on the LAN to access the Internet. Suggest a suitable IP address that could be allocated to **Port X** of the Combined Device.

_____

(1)

(b) What physical network topology has been used for the LAN?

_____

(1)

(c) The IP addresses allocated to the devices on the LAN are non-routable IP addresses.
The IP address allocated to **Port Y** of the combined device is a routable IP address.

Explain why the devices connected to a LAN are usually given non-routable IP addresses.

_____

_____

_____

(2)

(d) The desktop computer is uploading a file to an FTP server on the Internet.

The FTP server has IP address 67.84.23.102

Explain how the desktop computer will use the subnet mask (255.255.255.0), that it has been programmed with, to determine that the data being sent to the FTP server must be sent to the combined device from where it will be transferred on to the Internet.

_____

_____

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_____

_____

(3)

(e) The combined device contains a firewall.

Describe how the firewall might control the data that flow between the LAN and the Internet.

_____

_____

_____

_____

_____

(3)

(f) The ADSL connection to the Internet is broadband and the cabled connections within the LAN are baseband.

Explain the difference between a broadband connection and a baseband connection.

_____

_____

(1)

(g) The smart TV is capable of being connected to the network wirelessly or using a cabled connection.

Explain why a cabled connection has been used.

_____

_____

(1)

(Total 12 marks)

Q14.

A student uses the following URL to download a copy of a previous year's COMP2 exam paper.

https://www.aqa.org.uk/gce/computing/2012comp2.pdf

A B C

(a) (i) Describe the **three** labelled parts of this URL.

A _____

_____

B _____

_____

C _____

_____

(3)

(ii) State the top-level domain part in the URL.

_____

(1)

(b) To access the exam paper, the student's computer might need to make use of a Domain Name System (DNS) query which is transmitted to a DNS server.

(i) What is the role of a DNS server?

_____

_____

(1)

(ii) In some circumstances the student's computer will not need to contact a remote DNS server to access a resource.

Describe **two** situations when a DNS query will **not** be sent to a remote DNS server.

Situation 1 _____

_____

Situation 2 _____

_____

(2)

(c) In the process of requesting a web page, a browser will generate an HTTP GET request.

(i) In which layer of the TCP / IP stack is the browser operating?

_____

(1)

(ii) Explain why the student's computer might need to make several HTTP GET requests to display one web page.

_____

_____

(1)

(iii) The HTTP GET requests are being sent to port 80 on the remote machine. The browser has been allocated a **client port number**.

What is meant by a client port number?

_____

_____

(1)

(Total 10 marks)

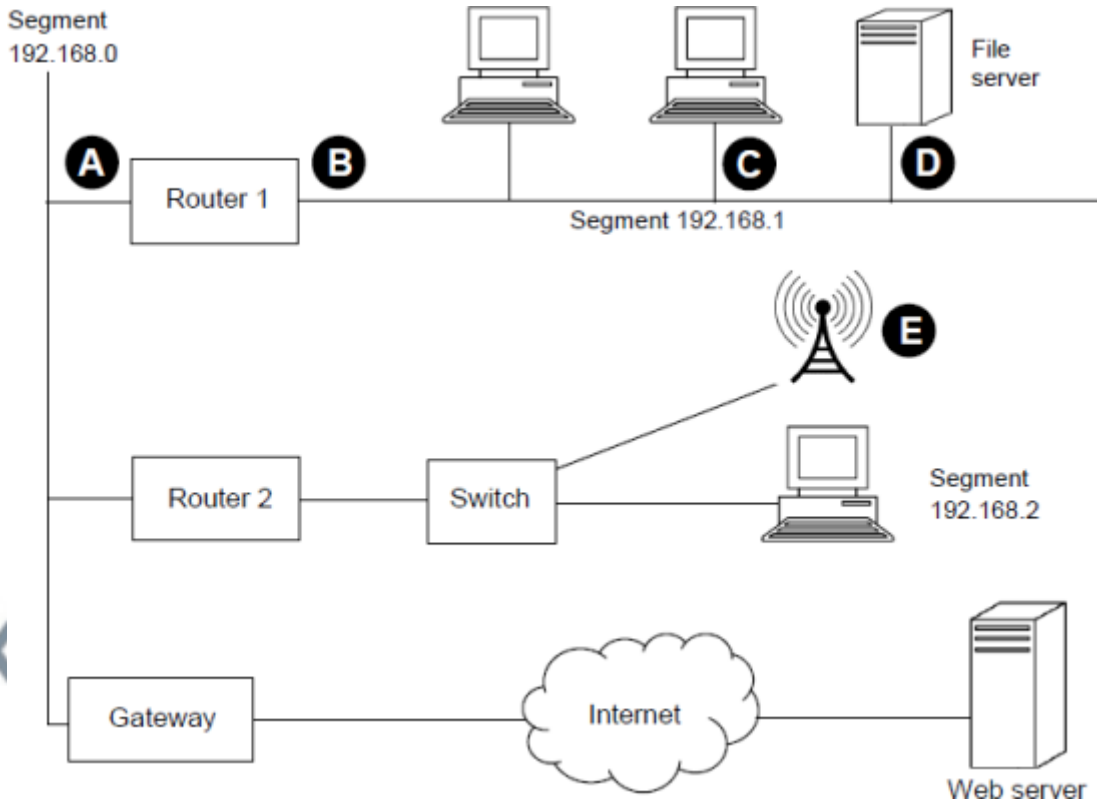
Q15.

A student is using her computer at school.

Figure 1 shows the physical topology of the Local Area Network (LAN) to which her computer is connected. The LAN is divided up into segments. It also shows a web server that her computer connects to through the Internet.

The student is using computer C.

Figure 1



(a) Suggest suitable IP addresses for:

(i) the "Router 1" port labelled A _____

(ii) the "Router 1" port labelled B _____

(iii) the network adapter card in the student's computer, labelled C

_____

(3)

(b) What physical network topology is used within segment 192.168.1?

_____

(1)

(c) When the computers in segment 192.168.1 were configured on the network, they were programmed with a subnet mask.

What subnet mask would have been used?

_____

(1)

(d) The student has been accessing data from the file server computer that is labelled D on **Figure 1**. This file server uses a server operating system.

Explain what a *server operating system* is.

_____

_____

_____

(1)

(e) Some other students using laptops are connected to the LAN by Wi-Fi through the Wireless Access Point that is labelled E on **Figure 1**. Wireless communication is less secure than communication using cables.

(i) Describe **one** measure that could be implemented by the Wireless Access Point to improve the security of the network.

_____

_____

_____

(1)

(ii) Explain why Wi-Fi has been chosen for this connection rather than Bluetooth.

_____

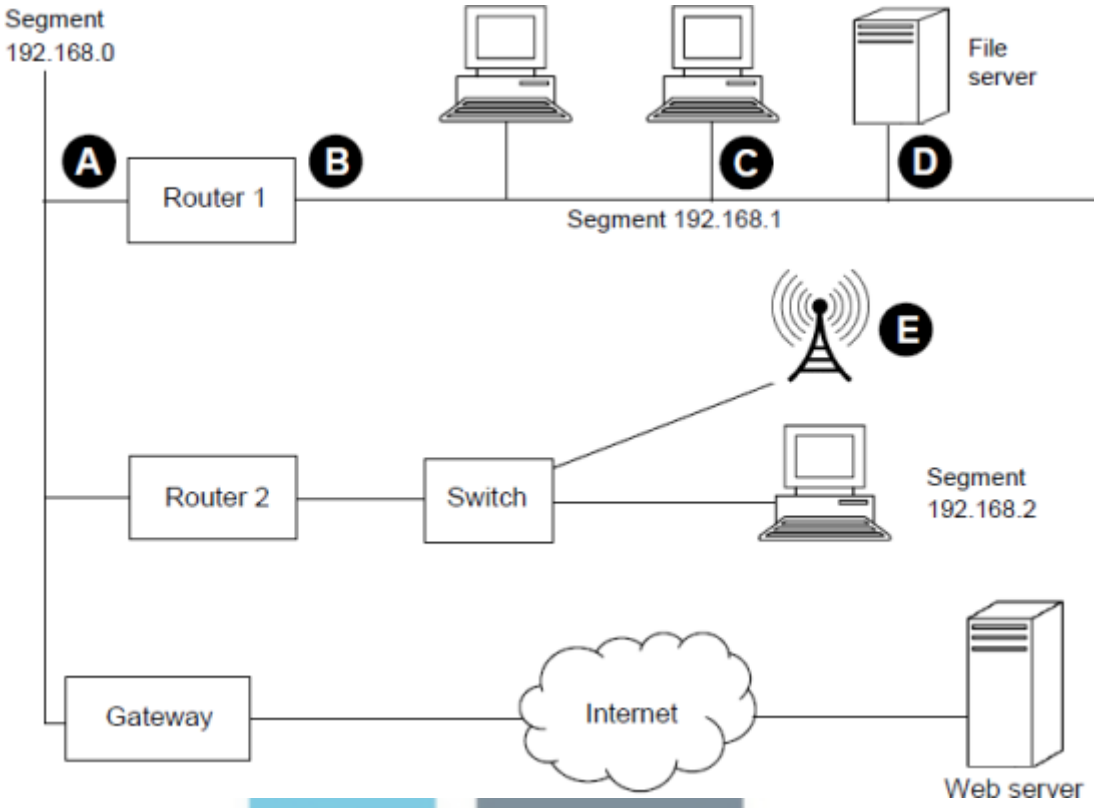
_____

_____

(1)

Figure 1 is repeated below so that you can answer question part **(f)** without having to turn back in the question paper booklet.

Figure 1(repeated)



The student now uploads a file from her computer to a web server over the Internet.

(f) Write a detailed description of how one packet of data that the student is uploading to the web server will be routed from her computer in the United Kingdom to the web server that is located in Chicago in the United States of America. You may assume that the web browser software on the student's computer has already looked up, using a domain name server, the IP address of the web server.

Your description should cover:

- how the packet will be routed within the LAN from the student's computer to the gateway **and**
- how, once it has reached the gateway, the packet will be routed across the Internet to the web server that the data is being uploaded to.

In your answer you will be assessed on your ability to use good English, and to organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

(8)

(g) The web server has a routable IP address.

The student's computer has a non-routable IP address.

Explain **two** differences between routable and non-routable IP addresses.

Difference 1: _____

_____

Difference 2: _____

_____

(2)

(Total 18 marks)

Q16.

An ICT technician at a secondary school has access to a variety of programs that she uses to manage a group of servers.

(a) State **one** use for each of the protocols listed below.

(i) Telnet: _____

(1)

(ii) FTP: _____

(1)

(iii) POP3:_____

(1)

(b) Whilst remotely connecting to one of the servers the technician executes a command that displays the current network connections. The table below shows these network connections.

Active Internet Connections					
Proto	Recv-Q	Send-Q	Local Address	Foreign Address	(state)
tcp4	0	0	192.168.3.205:80	74.125.4.148:58539	ESTABLISHED
tcp4	0	0	192.168.3.205:80	208.43.202.29:57458	ESTABLISHED
tcp4	37	0	192.168.3.205:25	208.43.202.29:57459	CLOSE_WAIT

From the table above provide an example of the following:

(i) IP address: _____

(1)

(ii) Port::

_____

(1)

(iii) Socket: _____

(1)

(c) State **two** reasons why the technician uses remote management software from her computer rather than going to the actual servers.

Reason 1: _____

_____

Reason 2: _____

_____

(2)

(Total 8 marks)

Q17.

A systems analyst is planning a system for the administration of student courses to be used in an office in a college. The system must allow users at ten workstations to access and update a central database.

(a) The analyst initially plans to use either a peer-to-peer or a server-based network.

Explain why a server-based network is likely to be more appropriate than a peer-to-peer network in this situation.

_____

_____

_____

_____

_____

_____

(2)

(b) After considering other alternatives, the analyst finally decides to use a thin-client network.

Explain how a thin-client network works and how the use of a thin-client network instead of a traditional rich-client (thick-client) network will affect the selection of the hardware to be used by the system.

In your answer you will be assessed on your ability to use good English, and to organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

_____

_____

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_____

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_____

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_____

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_____

(4)

(c) The system will be networked within the college. This network will then be connected to the Internet so that staff who are out of the college can log in and access the system.
This connection will use a gateway.

What is the purpose of the gateway?

_____

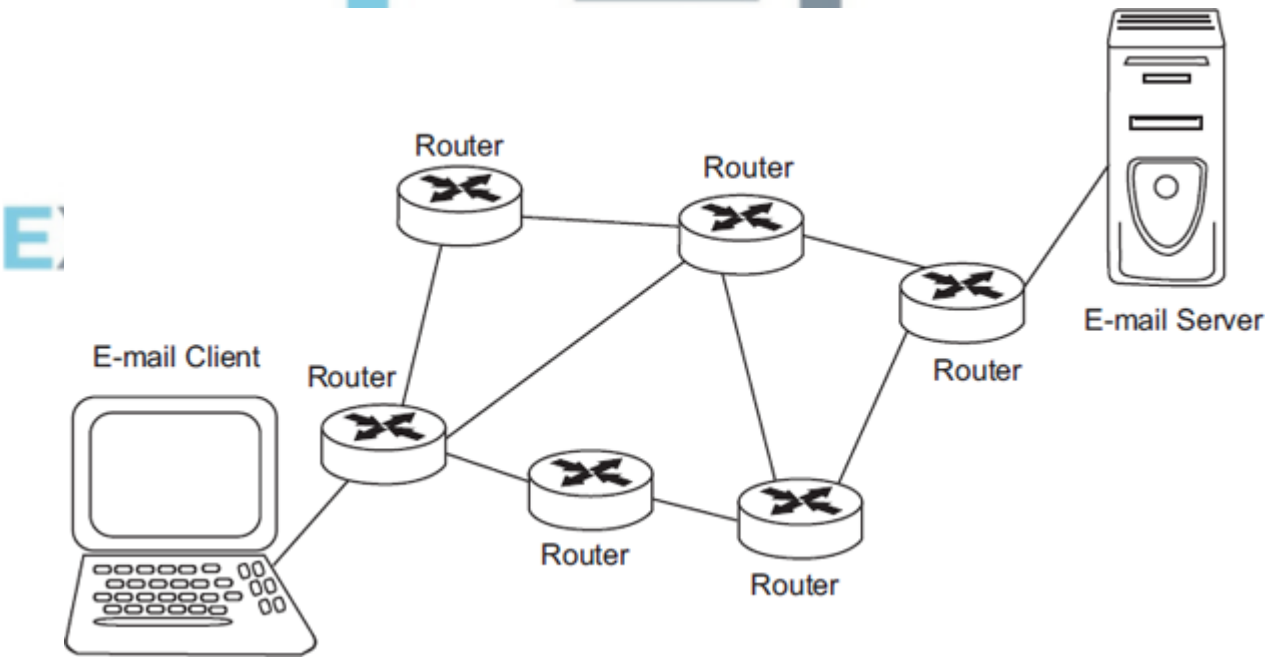
_____

(1)

(Total 7 marks)

Q18.

The diagram below is a partial view of a router network connecting an e-mail client to an e-mail server.



(a) Describe **two** roles of the routers shown in the diagram above.

Role 1: _____

_____

Role 2: _____

_____

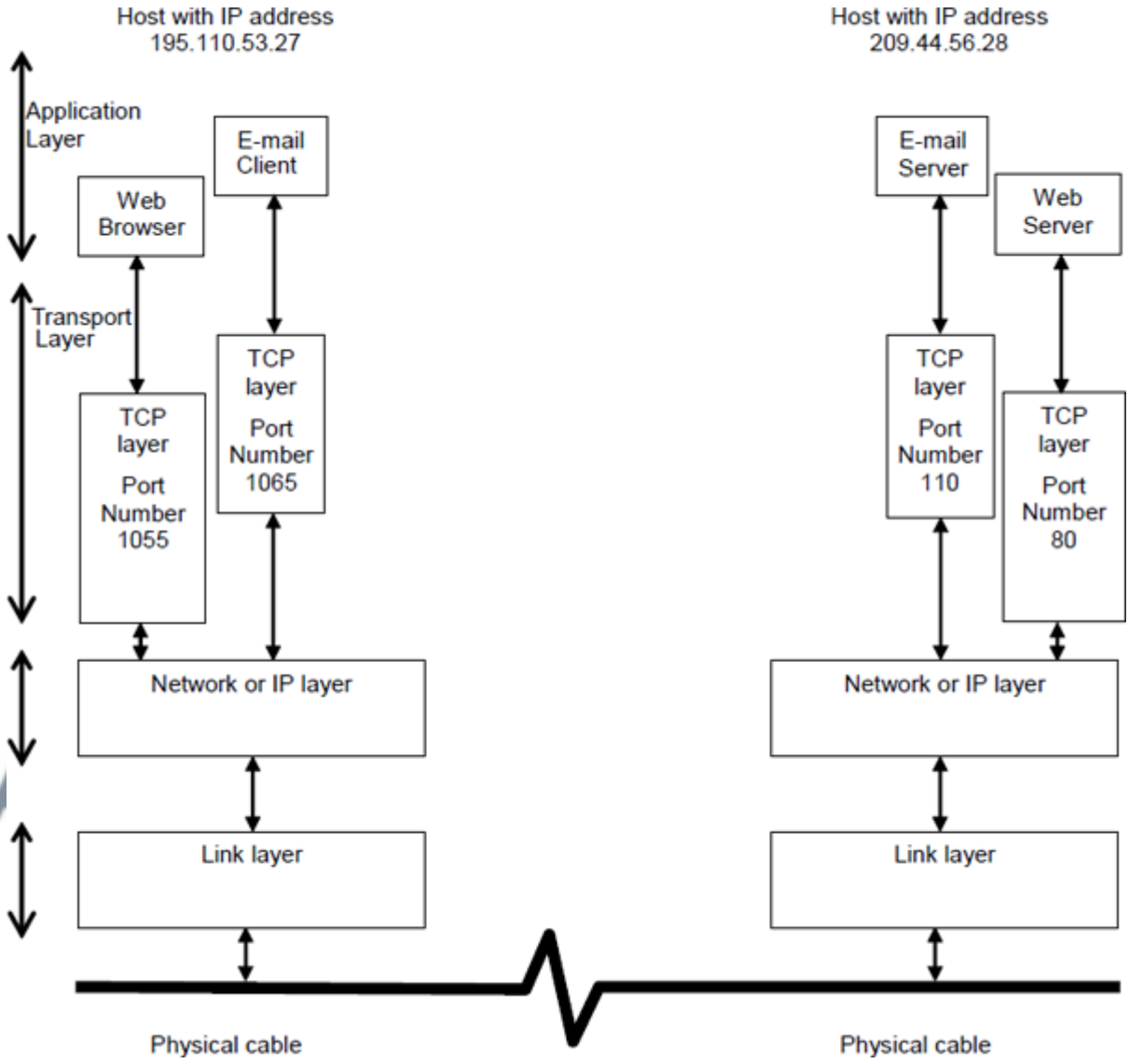
(2)

(b) Name **one** of the application protocols associated with e-mail.

_____

(1)

(c) The diagram below shows the TCP/IP stack for two computers (hosts) connected via a network.



Explain how the TCP/IP stack in each host supports an e-mail client to e-mail server request at the same time as a web browser to web server request. You should cover in your explanation:

- the steps from the initiation of a request to the receipt of a response
- the role of the different TCP/IP layers in the stages of client-server operation
- the use of packets.

In your answer you will be assessed on your ability to use good English and to

organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

(6)

(Total 9 marks)

Q19.

All Internet communications use the TCP/IP protocol stack, which is considered to have **four** layers – the application, transport, network and link layers.

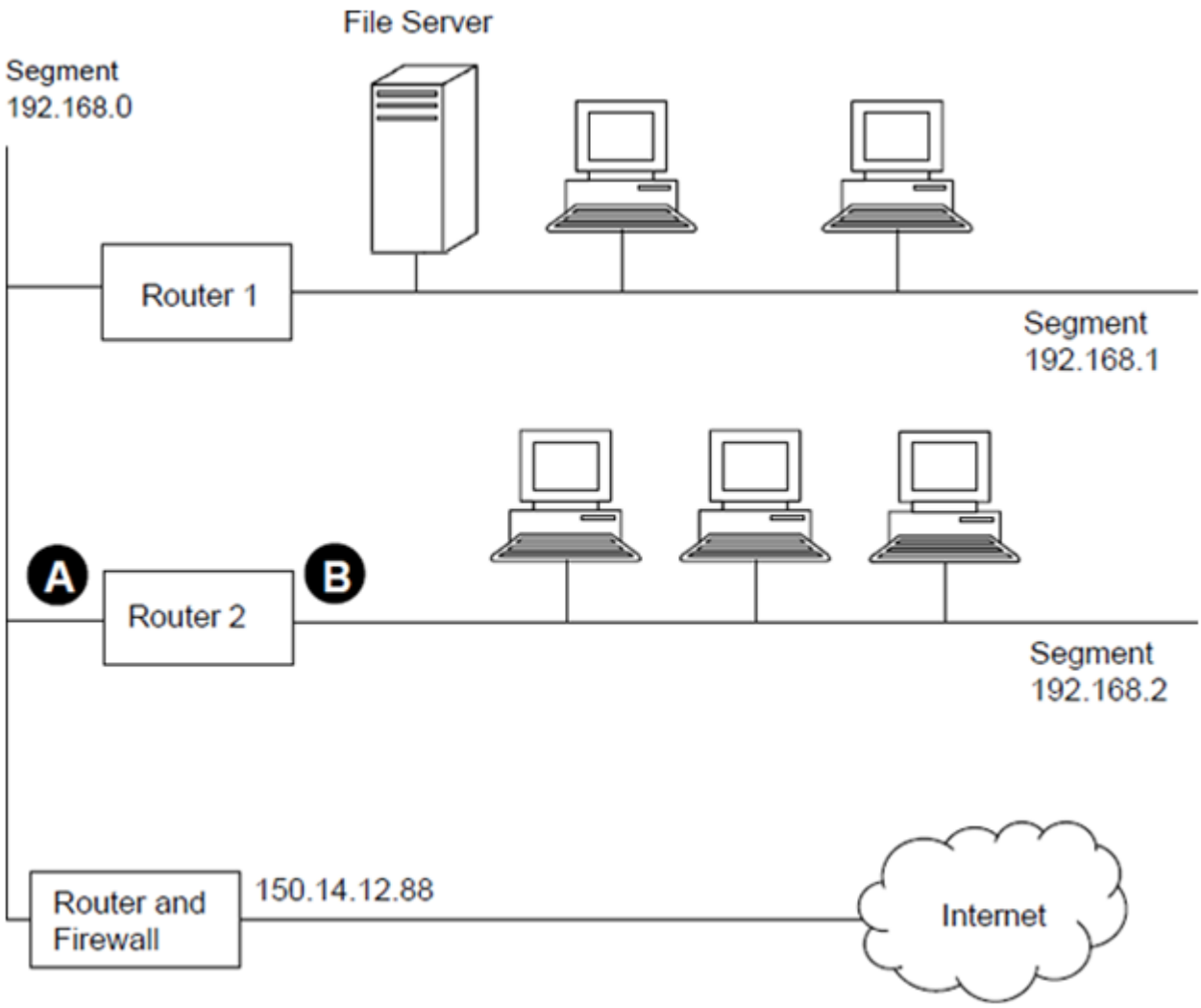
Describe the roles of each layer when two devices are communicating over the Internet.

In your answer you will also be assessed on your ability to use good English, and to organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

(Total 8 marks)

Q20.

The figure below shows the topology of a particular computer Local Area Network (LAN) that is divided up into segments.



(a) Suggest suitable IP addresses for:

(i) the Router 2 port labelled A : _____

(ii) the Router 2 port labelled B :_____

(2)

(b) When the computers in segment 192.168.2 were configured on the LAN, they were programmed with a subnet mask.

What subnet mask should have been used?

_____

(1)

(c) The LAN has a bus topology and has been divided into segments.

Explain why the LAN has been segmented.

_____

_____

(2)

(d) Alternatively, the LAN could have been constructed using a star topology.

(i) State **one** advantage of using a bus topology and explain how the advantage is achieved.

(1)

(ii) State **one** advantage of using a star topology and explain how the advantage is achieved.

(1)

(e) Discuss the security threats that the network manager will need to deal with because the LAN is connected to the Internet, together with how these may be dealt with.

In your answer you will also be assessed on your ability to use good English, and to organise your answer clearly and coherently in complete sentences, using specialist vocabulary where appropriate.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

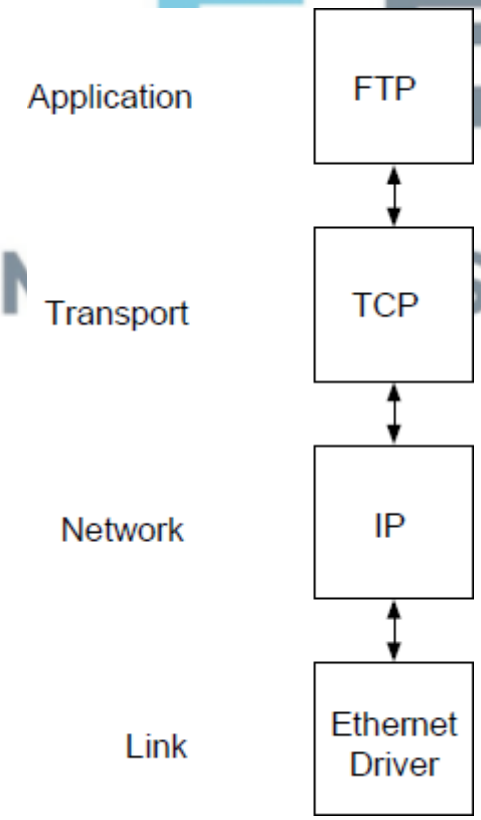
_____

(6)

(Total 13 marks)

Q21.

The diagram below shows the TCP / IP protocol stack as applied to a network.



(a) Describe **two** tasks that the transport layer performs.

1. _____

_____

2. _____

_____

(2)

(b) FTP is an application layer protocol.

Name another application layer protocol.

_____

(1)

(c) A router is a vital component in the structure of the Internet.

In which layer of the TCP/IP protocol stack does a router operate?

_____

(1)

(Total 4 marks)

Q22.

To request a particular web page on the Internet a user will need to enter into the address bar of their web browser a Uniform Resource Locator (URL).
This is in the form of:

```
http://www.aqa.org.uk/courses/computing.html
```

(a) The first part `http://` is the protocol.

Describe the following parts of this URL.

`aqa.org.uk`

_____

`courses/computing.html`

_____

(2)

(b) What is a protocol?

_____

(1)

(c) A requested page might be found locally on an intranet or it may be found on the Internet.

State **two** similarities between an intranet and the Internet.

1. _____

_____

2. _____

_____

(2)

(d) 192.120.12.67 is a typical IP address.

Why do people prefer to use a Fully Qualified Domain Name (FQDN) rather than an IP address?

_____

_____

(1)

(Total 6 marks)

Q23.

An Internet user uses a web browser to access the World Wide Web.

(a) Web pages can be retrieved from a web server using either the HTTP or the HTTPS protocol.

(i) What does HTTP stand for? _____

(1)

(ii) What is the difference between HTTP and HTTPS?

_____

_____

(1)

(iii) Describe a typical website that might be accessed using HTTPS.

_____

_____

(1)

(b) The computer that is retrieving a web page from a web server is known as a client. It will use a client port for the communication.

What is a *client port*?

_____

_____

(1)

(c) A web server uses well known port numbers to provide a service to client computers.

Why must these port numbers be well known?

_____

_____

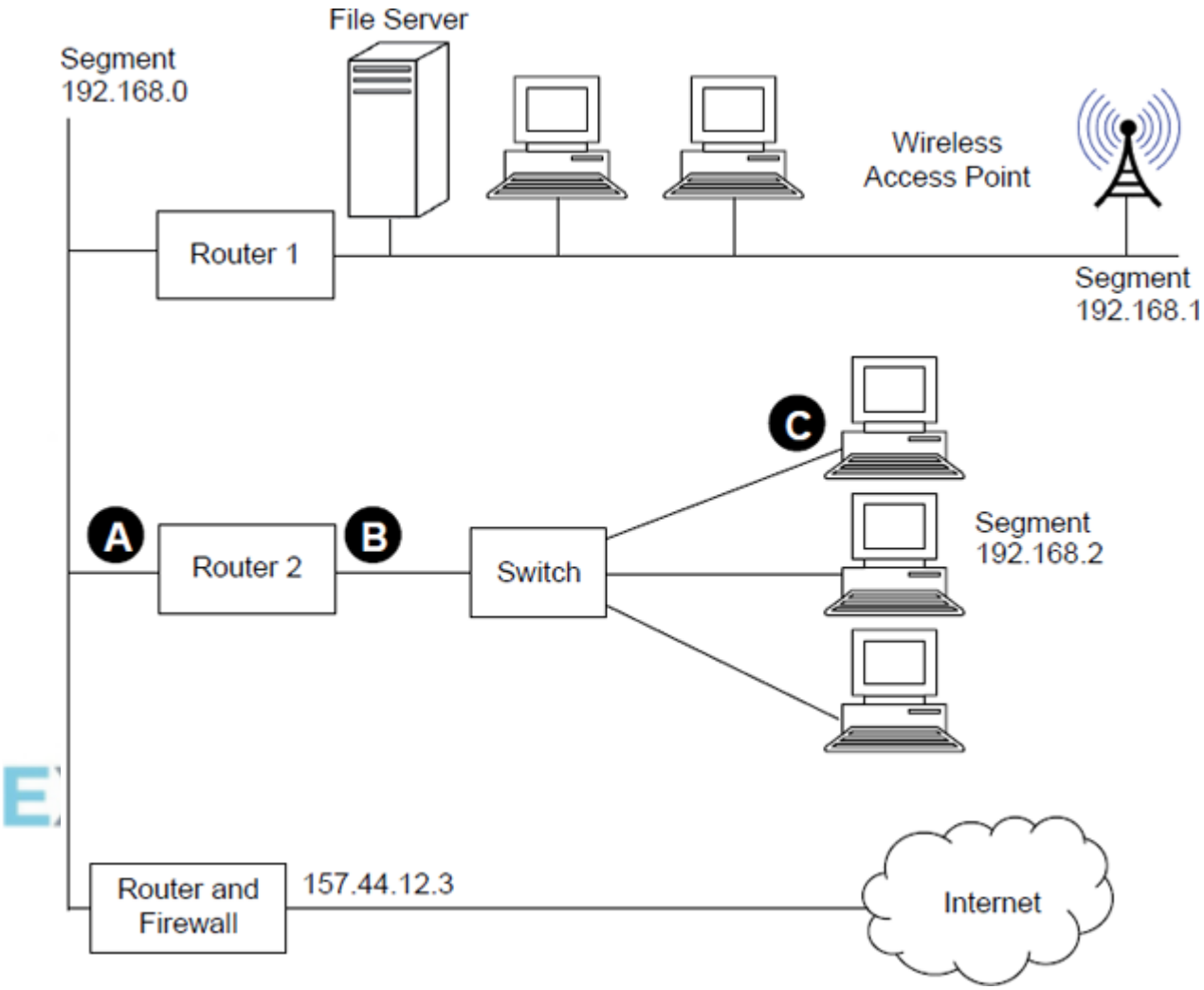
_____

(2)

(Total 6 marks)

Q24.

The diagram below shows the topology of a particular computer network that is divided up into segments.



(a) Suggest suitable IP addresses for:

(i) the "Router 2" port labelled **A**: _____

(ii) the "Router 2" port labelled **B**: _____

(iii) the computer network interface card labelled **C**: _____

(3)

(b) What physical network topology is used within segment 192.168.2 to connect the computers to the switch?

_____

(1)

(c) When the computers in segment 192.168.2 were configured on the network, they were programmed with a subnet mask.

What is the purpose of a subnet mask, and what would the subnet mask be in this case?

Purpose: _____

_____

Subnet mask: _____

_____

(2)

(d) Laptop computers connect to the network wirelessly using Wi–Fi. Wireless communication is less secure than communication using cables.

Explain **two** measures that the Wireless Access Point could use to improve the security of the network.

Measure 1: _____

_____

_____

Measure 2: _____

_____

_____

(2)

(e) The computers in segment 192.168.1 use Carrier Sense Multiple Access with Collision Detection (CSMA/CD) to determine when to transmit data.

Explain how the CSMA/CD method is used, including what happens in the event of a collision occurring.

In this question you will also be assessed on your ability to use good English and to organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 14 marks)

Q25.

Computers connected to the Internet use the TCP/IP suite of protocols for data transmission.

(a) What is a protocol?

_____

_____

(1)

(b) The TCP/IP stack is divided into four layers. One of these is the application layer protocol.

The table below shows four different scenarios that all use the TCP/IP protocol.

Complete the table below by writing the name of the particular application layer protocol that would be used to transfer data during each operation. You must give a different answer in each case.

	Operation	**Application Layer Protocol**
(i)	Managing a server remotely	
(ii)	Retrieving e-mail from an e-mail server	
(iii)	Viewing a sports news web page	

	using a web browser	
(iv)	Accessing your online bank account using a web browser	

(4)

(Total 5 marks)

Q26.

(a) Explain **one** similarity and **one** difference between the Internet and an intranet.

Similarity:_____

_____

_____

(1)

Difference:_____

_____

_____

(1)

(b) Computers connected to the Internet use the TCP/IP suite of protocols for data transmission.

(i) What is a protocol?

_____

_____

_____

(1)

(ii) Name **two** of the layers in the TCP/IP protocol stack.

Describe **one** function of each of the layers that you have named.

	Layer name	**Description of layer function**
1		

2		

(4)

(Total 7 marks)

Q27.

The figure below shows the address bar of a web browser.

(a) This is used to access various websites.

(i) What does 212.219.90.65 represent?

_____

(1)

(ii) Another way to access a website is to key a **URL** into the address bar.

What does URL stand for?

_____

(1)

(b) Name and describe **two** features you would expect to find on the browser's menu or toolbar which are specific to browser software.

1. _____

Description: _____

2. _____

Description: _____

(2)

(c) AQA Wanderers are a local soccer club which has a website. The club's players and members frequently access this website using the URL:

http://www.footyhosting.co.uk/aqawanderers/home.asp

The club pay an annual subscription to the company Footy Hosting Ltd to host the club's site. The company also hosts the sites for hundreds of other soccer clubs.

(i) What is the **domain name** of the website being accessed?

_____

(1)

(ii) Explain from the URL shown, how the company may have organised the storage of the pages for all the clubs it manages on its web server.

_____

(1)

(d) The soccer club's own computer is used to manage and upload the page content for AQA Wanderers and is done using a broadband connection.

Select from the list below **the most probable value** for the **transfer rate** of the data using the broadband connection. Put a circle around your answer.

20 MB 1.6 GHz 200 bps (bits/sec) 2 Mbps 128 Kbps

(1)

(e) The website for a single soccer club takes up approximately 5GB of storage space.

Footy Hosting Ltd currently has 500 clubs as customers and hopes to double this by the end of 2009.

(i) What type of secondary storage is used for a web server?

_____

(1)

(ii) Select from the list below **one** value for the minimum size of web server required to host the sites for all clubs (including the proposed expansion in business). Put a circle around your answer.

50 MB 500 MB 20 GB 100 GB 8000 GB

(1)

(Total 9 marks)

Q28.

(a) An IP address can be represented in the form w.x.y.z, where each letter represents the value of one byte of the IP address. Some addresses have special uses, such as w.x.y.1, which by convention is the default gateway address.

Explain how the default gateway address is used by a host computer connected to a network.

_____

_____

_____

_____

(2)

(b) Using the Domain Name System (DNS) we can refer to IP addresses by host name. Explain the role of a Domain Name Server, which makes this possible.

_____

_____

_____

_____

(2)

(Total 4 marks)

Q29.

A school Local Area Network (LAN) uses the TCP/IP protocol to communicate between computers.

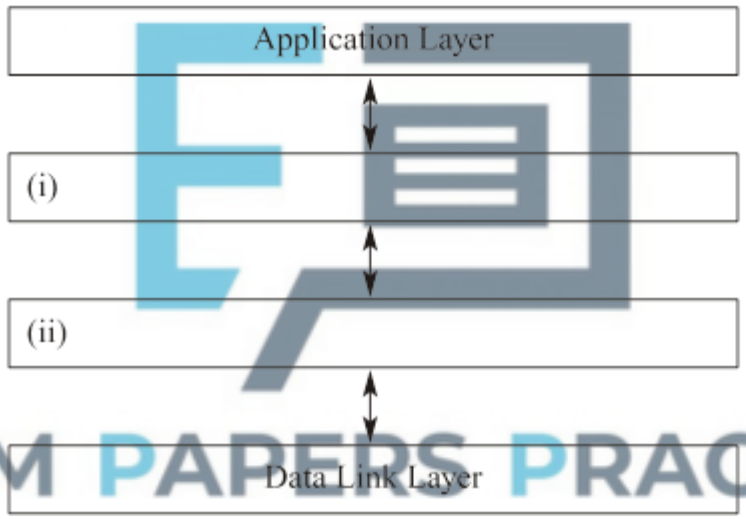
(a) What is a protocol?

_____

_____

(1)

(b) Complete the diagram of the TCP/IP protocol stack below:



(2)

(iii) Give **one** example of a type of application found in the Application Layer.

_____

(1)

(c) This LAN uses the Ethernet protocol as its Data Link Layer, which uses Ethernet MAC (Media Access Control) addressing to route Ethernet frames. What is an Ethernet MAC address?

_____

(1)

(d) The school now wants to connect to the Internet. Every computer in the LAN is given an IP address with a network ID of 192.168.4 and a subnet mask of 255.255.255.0.

(i) Give **one** example of an IP address for this LAN.

_____

(1)

(ii) How many different host IDs are there?

_____

(1)

(iii) What could the school do if it needs more host IDs?

_____

_____

(1)

(iv) IP addresses starting with 192.168 are private addresses. Why were private addresses chosen for the individual computers on the network?

_____

_____

(1)

(e) The school registers the IP address 222.125.105.15 with the Internet registrar. How can this IP address be used to connect to the Internet?

_____

_____

_____

(2)

(Total 11 marks)

Q30.

A company sets up a server-based network with ten terminals. Each terminal is a PC with its own secondary storage.

(a) The network was recently created from an existing set of stand-alone computers, and is used by a team of programmers. Describe **two** advantages that networking the computers has brought to the programming team.

1. _____

_____

2. _____

_____

(2)

(b) The network manager has the choice of:

Option 1: Installing all the applications software on the server.

Option 2: Installing the applications software on the hard drive of each PC.

(i) Describe **one** advantage to the network manager of Option 1.

_____

_____

(1)

(ii) Describe **one** advantage to a terminal user of Option 2.

_____

_____

(1)

(c) Each terminal communicates with a printer using a *handshaking protocol.*

(i) Explain the term protocol.

_____

_____

(1)

(ii) Explain the term handshaking.

_____

_____

(2)

(d) Clients who use the company's website input

http://www.smk-solutions.co.uk/index.htm

into the address bar of their browser.

What is the domain name for the company?

_____

_____

(1)

(Total 8 marks)

Q31.

(a) Using an example, outline the principles of Client-Server operation.

_____

_____

_____

_____

(3)

(b) Operating systems are often described as *event driven.*

(i) Explain what is meant by the term event driven.

_____

_____

_____

(2)

(ii) Give an example of an event.

_____

_____

(1)

(Total 6 marks)

Q32.

A small organisation, Acme Consultants, with four stand-alone computers in an office, want to set up a peer-to-peer network in order to share the printer connected to one of the computers.

(a) What is peer-to-peer networking?

_____

_____

(1)

(b) If an Ethernet switch is used to set up the network, draw a labelled diagram of the physical layout of the network.

(2)

(c) It is decided to set the IP addresses for each computer manually and use a subnet mask of 255.255.255.0.

(i) The following IP addresses were used for the computers:

Computer A: 192.168.5.2

Computer B: 192.168.5.3

Computer C: 192.168.4.4

Computer D: 192.168.5.5

Why is this not satisfactory?

_____

(1)

(ii) What should be the network ID of this network?

_____

(1)

(iii) What possible values could the host IDs take?

_____

(1)

(d) Acme Consultants now want to connect their network to the Internet using an ADSL line. A router is used to connect the network switch to the ADSL modem.

(i) What is the purpose of the router?

_____

_____

(1)

(ii) The IP addresses 192.168.5.1 and 222.125.105.15 are assigned to the router.

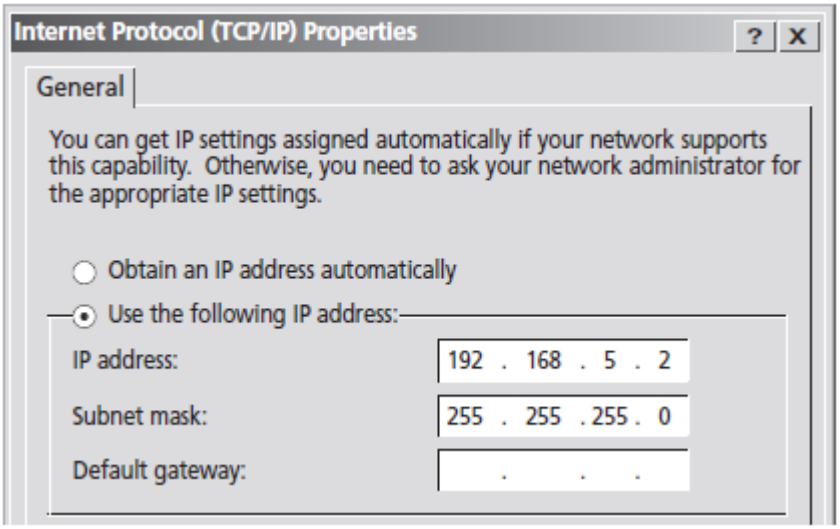
Which of the IP addresses needs to be registered with the Internet registrar and why?

IP address: _____

Reason _____

_____

(2)



(iii) The diagram above shows part of the TCP/IP configuration window displayed on the monitor of computer A. What IP address should be entered for the Default gateway?

_____

(1)

(Total 10 marks)

Q33.

A software company, ABC Ltd, proposes that in the future customers who buy ABC Ltd's software will buy only the rights to store and execute this software on ABC Ltd's servers. ABC Ltd will operate an on-line service to its customers to allow its software products to be centrally managed and shared. A customer at a workstation located anywhere in the world will send commands and data for processing to ABC Ltd's servers which will then return the results of processing to the customer's workstation.

(a) Which type of network, Wide Area Network (WAN) or Local Area Network (LAN), will connect customers to ABC Ltd's on-line service?

_____

(1)

(b) Developing software purely as an on-line service eliminates the need to distribute software on CD-ROM. Describe **three** other benefits to ABC Ltd **or** its customers from this on-line service.

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

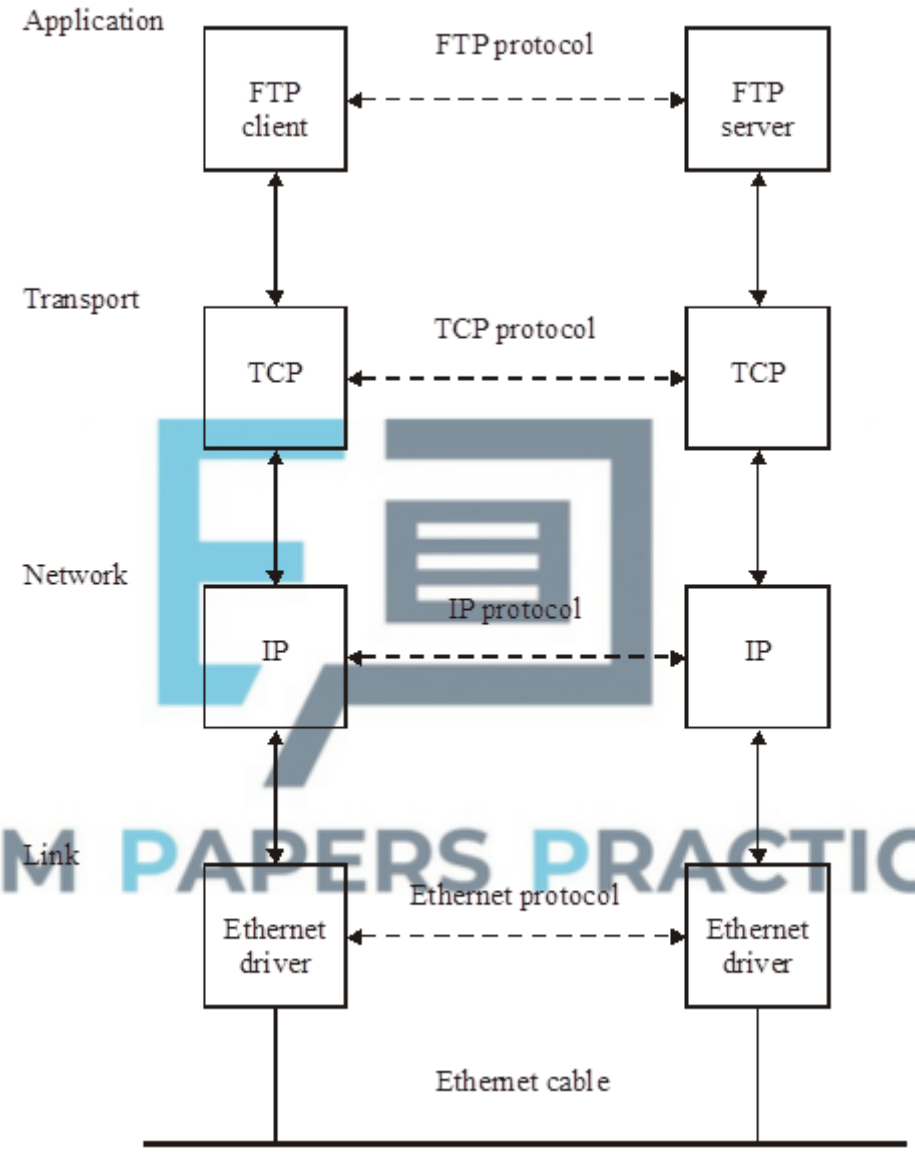
_____

(3)

(Total 4 marks)

Q34.

The figure below shows the TCP/IP *protocol* stack applied to a LAN (Local Area Network).



(a) What is a protocol?

_____

_____

(1)

(b) What is the topology of this local area network?

_____

(1)

(c) State a suitable type of network cable for the physical connections of this LAN.

_____

(1)

The IP protocol layer uses IP addressing to route packets.

(d) Give **two** examples of an IP address that could belong to the same LAN.

1. _____

2. _____

(2)

(e) Which part of your IP addresses identifies

(i) the LAN;

_____

(1)

(ii) the host on this LAN?

_____

(1)

(f) The Ethernet protocol layer uses Ethernet MAC (Media Access Control) addressing to route Ethernet frames. What is an Ethernet MAC address?

_____

(1)

(g) Describe **two** tasks performed by the TCP protocol layer

1. _____

_____

2. _____

_____

(2)

(h) Give **one** example of another type of application found in the Application layer.

_____

(1)

(i) If two local area networks are connected through the Internet each must have a registered public IP address. Name the **type** of organisation responsible for recording the allocation of public IP addresses.

_____

(1)

(Total 12 marks)

Q35.

(a) When setting up a relational database, entities, *attributes* and relations must be determined. A relational database is to be set up to hold details about sailing holidays.

(i) A relational database is more than a collection of tables. How are relationships implemented in a relational database?

_____

_____

(2)

(ii) What is an attribute?

_____

(1)

(b) (i) What is the purpose of data validation?

_____

(1)

(ii) Give **one** example of a typical built-in validation control that might be applied to a sailing holiday database.

_____

(1)

(Total 5 marks)