2015-DSE
ICT
PAPER 2B

Please stick the barcode label here.

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2015

Candidate Number

INFORMATION AND COMMUNICATION TECHNOLOGY
PAPER 2B
Data Communications and Networking
Question-Answer Book

11.15 am – 12.45 pm (1 hour 30 minutes)
This paper must be answered in English

INSTRUCTIONS

(1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3 and 5.

(2) **ANSWER ALL QUESTIONS.** Write your answers in the spaces provided in this Question-Answer book. Do not write in the margins. Answers written in the margins will not be marked.

(3) Supplementary answer sheets will be supplied on request. Write your candidate number, mark the question number box and stick a barcode label on each sheet, and fasten them with string **INSIDE** this book.

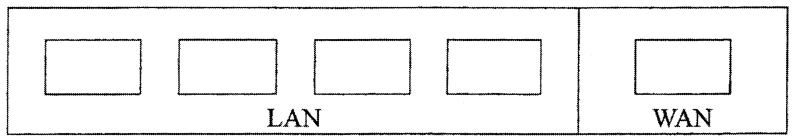
(4) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

* A 2 0 0 E 0 2 B *

Provided by dse.life

Answer all questions.

1. Bill wants to set up a wired network with a router at home. The back of the router is shown below.



(a) Which ports in the router should the following items connect to?

A desktop computer LAN (example)

A network printer _____

An Ethernet port connected to the Internet _____

A network-attached storage (NAS) device _____

(3 marks)

(b) Bill wants to connect a computer in his office to a desktop computer at home via a virtual private network.

(i) Do you think Bill needs to configure WPA2 in his router at home for security reasons? Explain briefly.

_____

_____

(ii) How does the virtual private network improve the network security?

_____

_____

(3 marks)

In Bill's office, he has a printer equipped with 32 MB RAM and a computer network of several desktop computers. He wants to set up a network printer using one of the following methods:

Method 1: Connect the printer to a router.

Method 2: Connect the printer to a desktop computer.

(c) (i) Give one advantage of Method 1 over Method 2.

_____

_____

(ii) Give one advantage of Method 2 over Method 1.

_____

_____

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

Please stick the barcode label here.

(d) When Bill prints a document file, the printer will receive a number of data packets.

(i) What does a data packet contain? Give **two** examples.

(ii) Suggest and describe a mechanism for managing the data transfer.

(4 marks)

(e) During the printing, the printer may send some messages such as 'Out of paper'.

(i) Is the data communication mode during the printing simplex or duplex? Explain briefly.

(ii) In this network, CSMA/CD is used to coordinate the data transmission. When data retransmission takes place, why is there a random period of waiting time?

(4 marks)

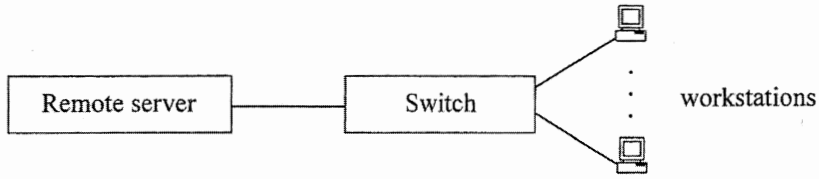
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

2. Mr Lau manages a serviced office. He designs a system with a virtual desktop infrastructure (VDI) for renters of the office such that the desktop environment and application software are stored in a remote server and can be used in any workstation in the network, as shown below.



(a) Mr Lau's design is a client-server system.

(i) Give **two** characteristics of the design.

(ii) Other than the network bandwidth, give **two** factors that will affect the performance of the system in the design.

(4 marks)

(b) Under the VDI, the estimated network usage of three types of renters is:

Type of renter	Application	Bandwidth per renter	Rent per day
Legal consultant	Office applications	50 kbps	$100
Wedding planner	Video conferencing	200 kbps	$500
Designer	Multimedia production	600 kbps	$800

(i) In which of the following scenarios will the office receive a higher daily rent? Show your calculation.

Scenario	Number of renters		
	Legal consultant	Wedding planner	Designer
A	20	15	10
B	20	20	5

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

Please stick the barcode label here.

Answers written in the margins will not be marked.

(ii) The maximum system throughput is 12 Mbps. Briefly explain whether the serviced office can support scenarios A and B. Show your calculation.

(4 marks)

(c) Renters can access the system through the Internet outside the office.

(i) Suggest an effective measure Mr Lau can use to improve network security and describe it briefly.

(ii) Mr Lau realises that the network might have experienced a Denial of Service (DoS) attack. How does a DoS attack affect the system?

(4 marks)

(d) Mr Lau wants to install an uninterruptible power supply (UPS) for the system.

(i) In the system, which device should have the highest priority for connecting to the UPS?

(ii) Give **two** major tasks that the device in (d)(i) may need to do immediately when the electricity cuts off.

(3 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

3. Paul is a network engineer and Ada is a technician. They are going to set up a computer network for visitors and staff in a library.

(a) Ada suggests that a wired network instead of a wireless network be provided for visitors.

(i) Give **two** advantages of Ada's suggestion for visitors.

(ii) Paul decides to install only a wireless network for the visitors. Give **two** reasons to support his decision.

(4 marks)

(b) The network allows visitors to access electronic materials in the library. Hence, Paul decides to install a proxy server. Briefly describe the purpose of installing the proxy server.

(2 marks)

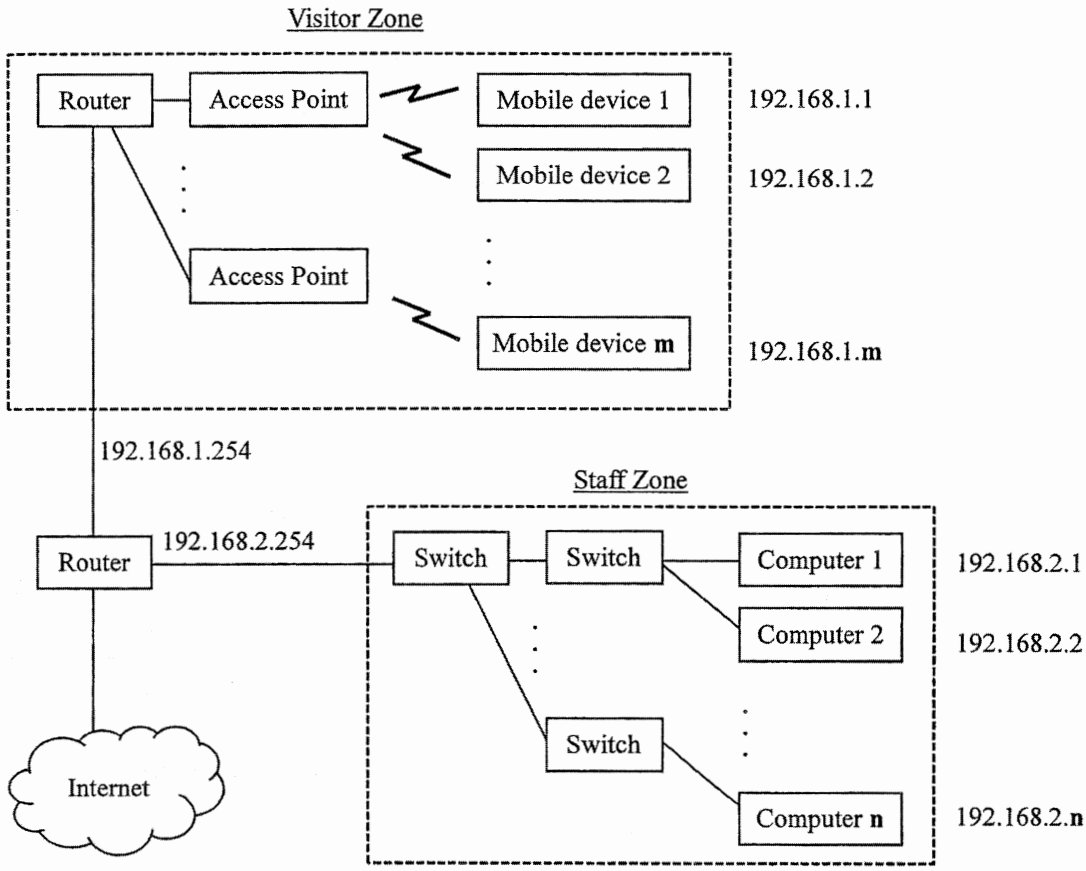
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

Paul divides the network into a staff zone and a visitor zone. Visitors' mobile devices and staff computers can only communicate within their zones and access the Internet. **m** and **n** are positive integers less than 250.



(c) Paul worries that some visitors in the visitor zone may hack the computers in the staff zone. He suggests installing a firewall to enhance the network security.

(i) Suggest a suitable location for installing the firewall. Use 'F' to label the location in the diagram above.

(ii) Describe **two** ways in which a firewall can enhance the network security.

_____

_____

_____

_____

(3 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

(d) (i) If the subnet mask for the network is set as 255.255.254.0, will the network work properly? Explain briefly.

(ii) Give the IP address of a proper gateway for Computer 1 in the staff zone.

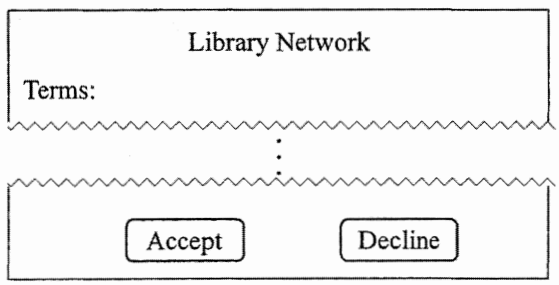
(2 marks)

(e) Ada sets up all access points using the default SSID.

(i) Paul suggests that Ada use another SSID. Give a reason to support his suggestion.

(ii) How does roaming take place with the access points using the same SSID?

(iii) Ada drafts some terms for visitors to accept when they first log on the network.



Give **two** examples of suitable terms.

(5 marks)

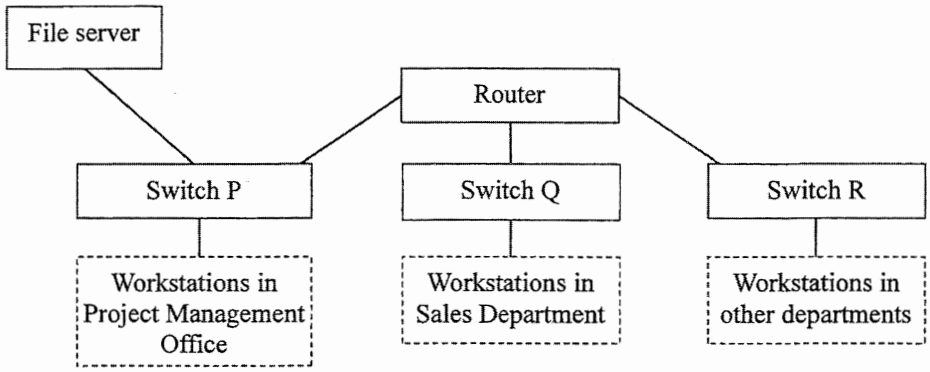
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

4. Mary is a project manager. She works on a project about setting up a new computer network for a company, as shown below.



(a) Briefly describe the use of the switches and the router in the network.

Switches: _____

_____

_____

Router: _____

_____

_____

(2 marks)

(b) Mary considers using Cloud storage instead of the file server. What is the advantage and disadvantage of Cloud storage for the network?

Advantage: _____

_____

_____

Disadvantage: _____

_____

_____

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

(c) (i) Mary drafts a test plan to validate the network. Briefly describe **two** test items in the test plan.

(ii) Mary has to do documentation for the technical staff. Give **two** important content items in the documents.

(4 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life

Mary can use the following command 'CR' to set the permissions of a folder in the file server and its subfolders will then have the same permissions.

CR	*permissions*	*folder*

Example 1: `CR g=r \usr\tmp1`
Example 2: `CR o=rwx, g=rw \usr\tmp2`

Character	Stand for
g	guests
o	folder owner
=	permission grant

Character	Stand for
r	*read*
w	*write*
x	*execute*

In example 1, the permission of `\usr\tmp1` for the guests is *read* only.

In example 2, the permissions of `\usr\tmp2` for the folder owner are *read*, *write* and *execute* while those for the guests are *read* and *write*.

(d) Mary plans to grant folder owners the *read* and *write* permissions and guests the *read* permission on `\usr\policy` and `\usr\reports`. She enters the following commands in sequence.

```
1    CR  o=rw          \usr\policy
2    CR  o=r, g=r      \usr\policy
3    CR  o=rw, g=rw    \usr\reports
4    CR  g=r           \usr\reports
5    CR  o=r, g=r      \usr
```

(i) After executing the 1st and 2nd commands, what are the permissions of `\usr\policy`?

(ii) After executing the 3rd and 4th commands, what are the permissions of `\usr\reports`?

(iii) Will the final result be appropriate? Explain briefly.

(iv) Rewrite the commands so that Mary can set the folder permissions efficiently.

(5 marks)

END OF PAPER

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Provided by dse.life