PP-DSE
ICT
PAPER 2B

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Candidate Number									

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

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

(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.

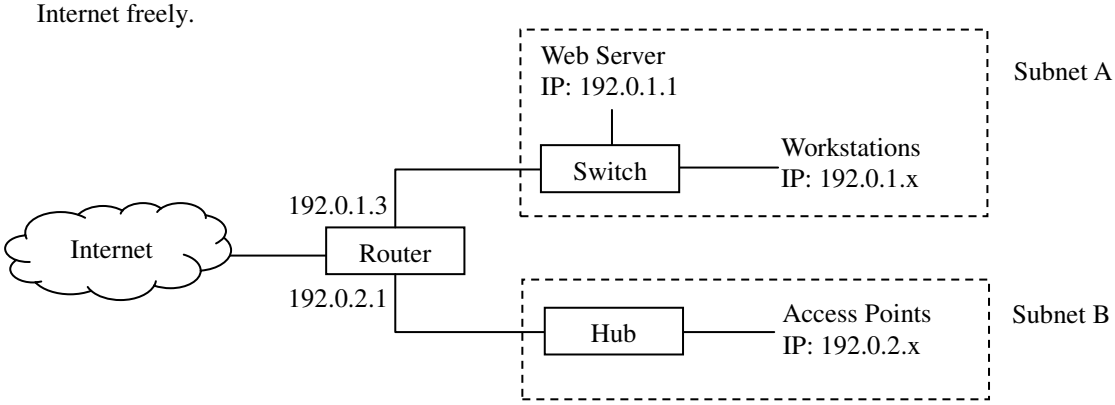
(3) Supplementary answer sheets will be supplied on request. Write your candidate number, mark the question number box and stick a barcode label on each sheet, and fasten them with string **INSIDE** this book.

(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 *

Answer all questions.

1. Ada is a network administrator. She sets up a network for a museum. The network is divided into two subnets, Subnet A and Subnet B. Subnet A consists of a web server and a number of workstations for the staff. Subnet B consists of a number of wireless access points (APs) for visitors to use to connect to the Internet freely.



(a) What kind of network topology is used in this network? Give one advantage and one disadvantage of this topology.

Network topology: _____

Advantage: _____

_____

Disadvantage: _____

_____

(3 marks)

(b) Ada wants to replace the hub in Subnet B with a switch. Give **two** advantages of a switch over a hub.

_____

_____

_____

(2 marks)

(c) (i) Name the devices in Subnet B using CSMA/CD and CSMA/CA.

CSMA/CD: _____

CSMA/CA: _____

(ii) Ada finds that the network throughput decreases greatly when the number of connections to the APs increases by only two. Why?

_____

_____

(4 marks)

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(d) In Subnet A, the IP address of the switch is 192.0.1.2 and the IP addresses of the workstations range from 192.0.1.4 to 192.0.1.21.

(i) Which class of IP addresses is being used? _____

(ii) Give the subnet mask and default gateway.

Subnet mask: _____

Default gateway: _____

(iii) Suggest a method for assigning IP addresses to the workstations in Subnet A. Give one advantage and one disadvantage of your suggestion.

_____

_____

_____

_____

(iv) In terms of IP address translation, explain how the web server in Subnet A can be accessed via the Internet.

_____

_____

_____

_____

(7 marks)

(e) A USB printer is to be shared among the workstations in Subnet A.

(i) Describe, step by step, how to share the printer among the workstations.

_____

_____

_____

(ii) Give one disadvantage of the printer sharing in (e)(i).

_____

_____

(3 marks)

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2. Peter is the network administrator in a secondary school.

(a) Peter wants to find a solution for each of the following problems:

P1: the spread of computer viruses due to the use of USB flash memory
P2: data loss due to the accidental deletion of files stored in a server
P3: data loss due to the accidental breakdown of a hard disk
P4: the impact on the servers of the accidental cut-off of electricity supply

Complete the following table to show the hardware / software required for solving the problems and describe the solutions briefly.

	Hardware / Software required	Description
P1		
P2		
P3		
P4		

(8 marks)

(b) One day, some teachers report that they cannot access the school web site from the workstations in the school.

In each of the following scenarios, what kind of hardware problem can Peter deduce?

(i) The teachers can browse other web pages in the Internet.

(ii) The teachers can browse the school web pages by using its public IP address.

(iii) The teachers fail to access the Internet using IP addresses of web sites, but they can access all the school network resources.

(3 marks)

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(c) A teacher connects his own notebook computer to the school network but he cannot access the Internet and school network resources. Describe how Peter uses some commands and/or utility programs to diagnose and solve the networking problems.

(4 marks)

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3. Mr Li sets up a computer network in a secondary school. He wants to set the following restrictions:

R1: Forbid students to browse the web sites with indecent materials.
R2: Forbid students to use the workstations to communicate with external computers directly.
R3: Forbid students to download files from the Internet using the FTP.
R4: Forbid students to install software in the workstations.

(a) Mr Li can use either a proxy server or a firewall to set R1. The two devices adopt content filtering and packet filtering respectively.

(i) How do the proxy server and the firewall perform filtering differently?

(ii) Mr Li considers using the proxy server only. Give one advantage and one disadvantage.

(4 marks)

(b) Describe how Mr Li administers the network so as to set the following restrictions.

(i) R2:

(ii) R3:

(iii) R4:

(6 marks)

Answers written in the margins will not be marked.

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(c) To make the maintenance of the computers easier, Mr Li needs to access the school network through the Internet. Hence, he needs to establish a secure channel for transferring data.

(i) Suggest a method that Mr Li could use.

_____

(ii) Give **two** disadvantages of the suggestion in (c)(i).

_____

_____

_____

_____

(3 marks)

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4. Mary is a network administrator. She is setting up a wireless network with a number of wireless access points (APs) in a library. Hence, readers can use their own mobile devices to connect to the Internet.

(a) (i) Other than a notebook computer, suggest **two** kinds of mobile devices that can connect to the APs.

_____

_____

(ii) Which hardware component in these mobile devices is the key part for the Internet connection?

_____

(3 marks)

Mary sets up two wireless local area networks, LIB-Y5a and LIB-Y5b, in the library for testing purposes. She uses a notebook computer to detect the wireless networks and has the following results:

SSID	Strength
LIB-Y5a *Unsecured wireless network*	✦✦✦✦✦✧
PUB-Y5 *Unsecured wireless network*	✦✦✧✧✧✧
LIB-Y5b *Security-enabled wireless network*	✦✦✦✦✦✦
HKEAA1 *Security-enabled wireless network*	✦✧✧✧✧✧
eaa *Security-enabled wireless network*	✦✦✦✧✧✧

(b) (i) Must the Service Set Identifier (SSID) of the wireless networks detected be unique? Explain your answer briefly.

_____

_____

_____

(ii) Why can some other wireless networks be detected?

_____

_____

(3 marks)

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Mary suggests two methods of connecting to a wireless network that can improve the network security, as illustrated in Figure 1 and Figure 2 below.

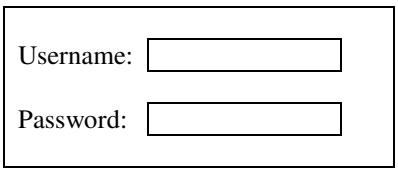

Figure 1

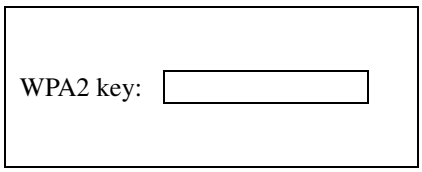

Figure 2

(c) (i) In each of the following boxes, put a '✓' if the corresponding method can be implemented for the network. Otherwise, put a '✗'.

	LIB-Y5a	LIB-Y5b
Figure 1		
Figure 2		

(ii) What is the main purpose of each method in maintaining the network security?

Figure 1: _____

_____

_____

Figure 2: _____

_____

_____

(iii) Does the method illustrated in Figure 1 require extra service or hardware? If yes, what?

_____

_____

(5 marks)

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(d) Peter is a reader. His computer detects the SSID of the free wireless network provided by the library. His friends successfully connect to the network but he is unable to connect. Give **two** network-related reasons for this.

(2 marks)

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