

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY  
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2022

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

11:15 am – 12:45 pm (1 hour 30 minutes)

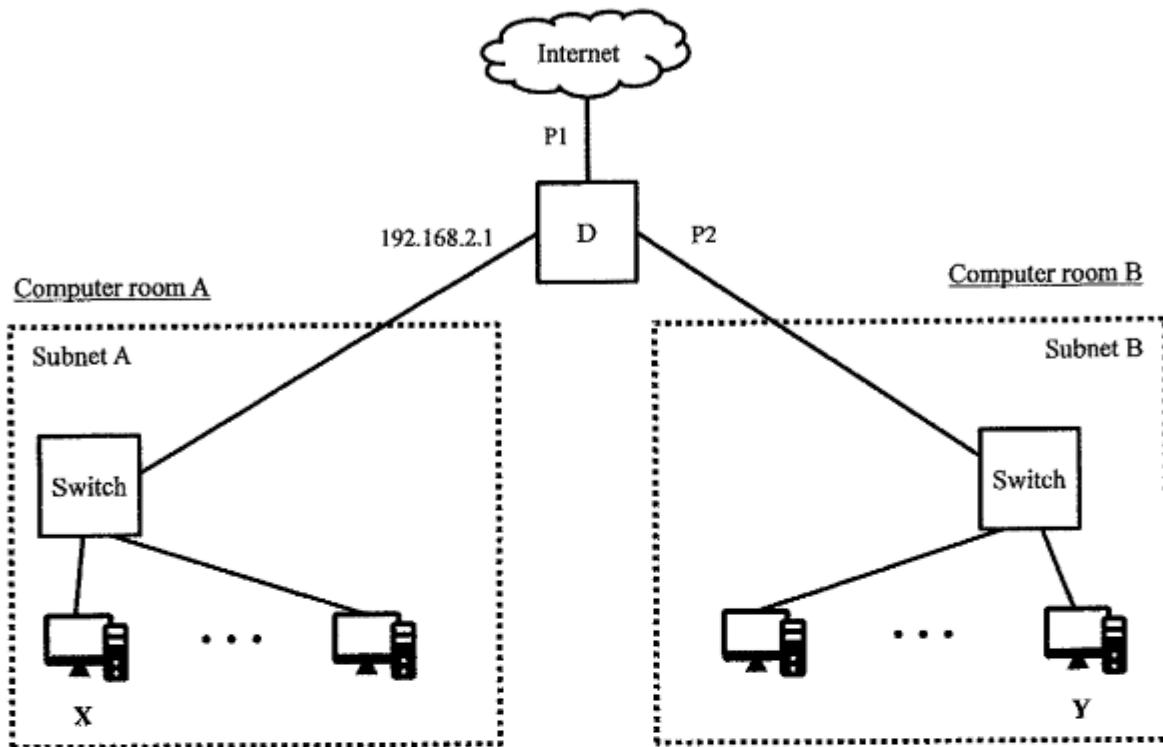
This paper must be answered in English

**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, 5 and 7.
- (2) Answer **THREE** out of four 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.

**Answer THREE questions only.**

1. Peter uses a class C network 192.168.2.0 for two computer rooms in his training centre. His Internet service provider provides an IP address 210.0.205.237 for the network. He sets up two subnets with computers X and Y, as shown below:



Answers written in the margins will not be marked.

(a) (i) What is device D? \_\_\_\_\_

(1 mark)

(ii) Give two reasons for setting up these two subnets.

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(2 marks)

(iii) Give a drawback of setting up these two subnets.

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(1 mark)

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Subnet A and Subnet B consist of 120 and 80 computers respectively.

- (b) Suggest an IP address for the interfaces P1 and P2 of device D respectively.

P1:

P2:

(2 marks)

- (c) Suggest an IP address, a subnet mask and a default gateway for X.

IP address:

Subnet mask:

Default gateway:

(3 marks)

- (d) Can Peter connect 50 additional computers to Subnet B? Explain briefly.

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(2 marks)

- (e) Peter finds that he can access a web site via X, but not via Y. Suggest two test commands that can be used on Y for troubleshooting this issue. Explain briefly.

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(4 marks)

Answers written in the margins will not be marked.

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2. John sets up a network with a firewall, a DNS server, a proxy server and a database server in a school.

(a) (i) Describe two network security functions of the firewall.

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(2 marks)

(ii) Describe a function of the DNS server for the network.

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(1 mark)

(b) The school can only afford to buy a UPS.

(i) Give two situations when a UPS would protect a server.

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(2 marks)

(ii) The UPS can only support one server. To which server in the school network should the UPS connect? Explain briefly.

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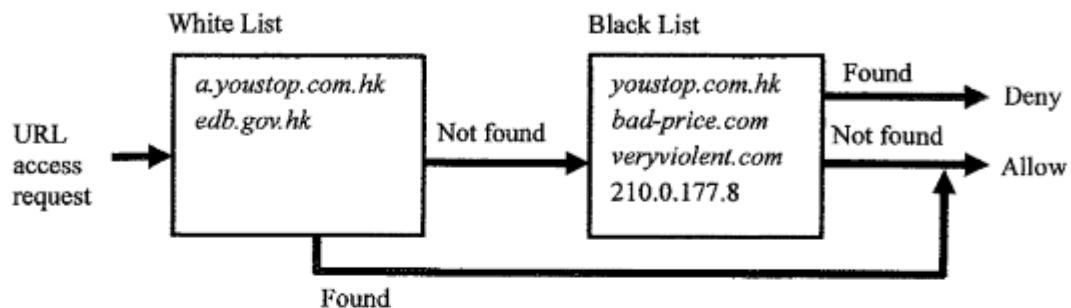
(1 mark)

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Please stick the barcode label here.

(c) The proxy server checks all URLs requested from the school network using the mechanism shown below.



(i) *bad-price.com* is on the Black List. Will access to *bad-price.com.hk* be allowed? Explain briefly.

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(2 marks)

(ii) Will access to *b.youstop.com.hk* be allowed? Explain briefly.

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(2 marks)

(iii) Give a possible reason why access to *selflearning.com* is denied.

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(1 mark)

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Answers written in the margins will not be marked.

(iv) Other than web filtering, give a function of the proxy server and describe how it works.

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(2 marks)

(d) Give **two** reasons why RAID-0 is used in the proxy server, instead of RAID-1.

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(2 marks)

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Please stick the barcode label here.

3. Mary arranges a sports week in a school. At each event venue, judges have tablets for storing event results that will be sent to the school file server via the Internet.

- (a) The tablets can send data through the Internet using a mobile phone network or a WiFi network. Give two differences between these transmission media from a technical point of view.

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(2 marks)

- (b) Mary develops a disaster plan for the server. Give two considerations related to file backup.

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(2 marks)

- (c) In addition to sending event results to the school file server, Mary sets up a streaming server to provide live broadcasting of events. Describe the applications of TCP and UDP for these two network activities.

TCP:

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UDP:

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(4 marks)

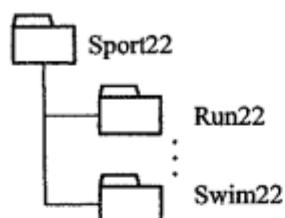
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- (d) A folder structure in the school file server is shown below and the user permission is applied according to the following rules.

Folder Structure



Rule 1: A permission of a folder will automatically be inherited by its child folders.

Rule 2: A deny permission overrides a grant permission.

Permission

R = Read a folder and files in that folder

W = Write files in a folder

D = Delete files in a folder

- ✓ Grant permission
- \* Deny permission

Permission Setting

Folder	Permission	User
Sport22	✓ R ✓ RWD	All users Mary, Principal
Run22	✓ RWD ✓ RW	Peter Eva
Swim22	* D	Principal

- (i) Tick the following box(es) to indicate the folder(s) that Eva can save photos in.

Sport22

Run22

Swim22

(1 mark)

- (ii) Tick the following box(es) to indicate who can delete files in Run22. Explain briefly.

Eva

Peter

Mary

Principal

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(2 marks)

Answers written in the margins will not be marked.

(iii) Tick the following box(es) to indicate who can delete files in Swim22. Explain briefly.

Eva       Peter       Mary       Principal

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(2 marks)

(e) Give an example of each of the following communication modes that can be used in the sport week and describe your answer briefly.

Simplex: 

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Duplex: 

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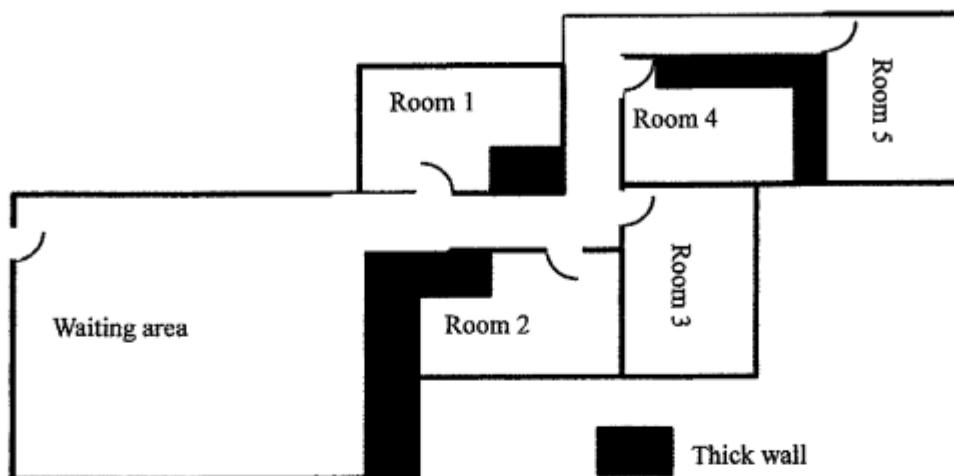
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(2 marks)

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4. The computer network in a clinic of 10 staff members consists of an access point (AP) for the waiting area and an AP for each room. The floor plan of the clinic is shown below:



Answers written in the margins will not be marked.

The computer network is composed of a staff network and a visitor network. The staff network can only be accessed by the staff, while the visitor network is set up for visitors. The configurations of the corresponding APs are:

**Staff network**

SSID: C-STAFF  
Frequency: 2.4GHz / 5GHz  
Maximum number of connections: 50  
Encryption type: WEP  
MAC filter:  
1A-09-2D-3F-49-12  
31-AB-C8-26-4C-C9  
⋮

**Visitor network**

SSID: C-VISITOR  
Frequency: 2.4GHz / 5GHz  
Maximum number of connections: 50  
Encryption type: WEP

- (a) In the clinic, no wired network is provided and staff members access the network via the APs. Give two advantages of this design.

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(2 marks)

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Regarding the use of the network, visitors usually watch videos in the waiting area while staff members use their mobile devices to access data files and image files in the clinic's servers. The specifications of the network are:

2.4GHz	5GHz
Lower data transfer rate	Higher data transfer rate
Larger coverage	Smaller coverage
Higher penetration power	Lower penetration power

- (b) Which frequency should be adopted for the staff and visitors respectively? Explain briefly.

Staff: \_\_\_\_\_

\_\_\_\_\_

Visitors: \_\_\_\_\_

\_\_\_\_\_

(3 marks)

- (c) The maximum number of visitors that can stay in the clinic is 30. An AP supports a maximum of 50 connections. Give two reasons why the clinic still plans to install an additional AP in the visitor network.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2 marks)

- (d) The wireless network interface card (NIC) in a staff computer is out of order and then it is replaced with a new one. All settings in this computer remain unchanged but the computer cannot connect to the staff network again. Why?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2 marks)

Answers written in the margins will not be marked.

- (e) Staff access patients' personal profiles through the staff network.

- (i) Give two settings of the APs to strengthen the wireless network security.

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(2 marks)

- (ii) A 20 MB X-ray image file is sent through the network and the data transfer rate is 50 Mbps. Assume that there is no data lost or overhead during transmission. Calculate the time in seconds for the file to be transmitted. Show your calculation.

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(2 marks)

- (f) Visitors have to accept the following terms of use before using the visitor network.

**Terms of use**

To connect to the visitor network, you must read and accept the terms below:

1. We reserve the right at all times to withdraw this service.
2. Visitors must not distribute computer viruses or engage in any illegal activities.

Accept

Decline

Suggest two additional terms of use.

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(2 marks)

**END OF PAPER**

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