

CONFIDENTIAL



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

COURSE NAME : COMPUTER NETWORKING
COURSE CODE : BIC 21303
PROGRAMME CODE : BIS / BIP / BIW / BIM
EXAMINATION DATE : JULY / AUGUST 2023
DURATION : 3 HOURS
INSTRUCTION :
1. ANSWER **ALL** QUESTIONS.
2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**.
3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

CONFIDENTIAL

TERBUKA

Q1 Answer the following questions based on the topology in **Figure Q1** and addressing table (**Table Q1**). Write suitable Internetwork Operating System Commands (IOS) to enable and access the Secure Shell (SSH) server on a switch and router.



Figure Q1

Table Q1

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0/1	192.168.2.1	255.255.255.0	N/A
S1	VLAN 22	192.168.2.22	255.255.255.0	192.168.2.1
PC-A	Network Interface Card (NIC)	192.168.2.3	255.255.255.0	192.168.2.1
Internet Protocol (IP) domain name of the network: uthm.edu.my				
Username: admin				
Password: @dmin01				

- (a) Configure the basic settings on the router.
- (i) Disable Domain Name System (DNS) lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names. (0.5 marks)
 - (ii) Assign `class` as the privileged EXEC encrypted password. (0.5 marks)
 - (iii) Assign `cisco` as the console password and enable login. (1.5 marks)
 - (iv) Assign `cisco` as the virtual terminal (VTY) password and enable login. (1.5 marks)

- (v) Encrypt the plaintext passwords. (0.5 marks)
 - (vi) Configure and activate the G0/0/1 interface on the router using the information contained in the addressing table. (1.5 marks)
- (b) Configure the Router for SSH Access.
- (i) Configure the device name as in the addressing table. (0.5 marks)
 - (ii) Configure the domain for the device. (0.5 marks)
 - (iii) Configure the encryption key method. (0.5 marks)
 - (iv) Configure a local database username `admin` and password `admin01`. (0.5 marks)
 - (v) Enable SSH on the inbound VTY lines 0-4. (1 mark)
 - (vi) Change the login method to use the local database for user verification. (0.5 marks)
- (c) Configure the basic settings on the switch.
- (i) Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names. (0.5 marks)
 - (ii) Assign `class` as the privileged EXEC encrypted password. (0.5 marks)
 - (iii) Assign `cisco` as the console password and enable login. (1.5 marks)
 - (iv) Assign `cisco` as the VTY password and enable login. (1.5 marks)

- (v) Encrypt the plain text passwords. (0.5 marks)
- (vi) Configure and activate the virtual local area network VLAN 22 interface on the switch according to the addressing table. (1.5 marks)
- (d) Configure the switch for SSH connectivity.
- (i) Configure the device name as in the addressing table. (0.5 marks)
- (ii) Configure the domain for the device. (0.5 marks)
- (iii) Configure the encryption key method. (0.5 marks)
- (iv) Configure a local database username `admin` and password `@dmin01`. (0.5 marks)
- (v) Enable SSH on the inbound VTY lines 0-15. (1 mark)
- (vi) Change the login method to use the local database for user verification. (0.5 marks)
- (e) From switch S1 command line interface (CLI), write SSH connection to router R1. (1 mark)

Q2

A TiggyNet Sdn Bhd has three branches: Kuala Lumpur as Headquarters, Kedah and Johor. The headquarters provides web, application, and email server services. They need to implement IP subnetting using a Variable Length Subnet mask (VLSM) to utilize its IP address space. The following are the IP addresses given for each branch:

- Headquarters - Kuala Lumpur: 192.168.10.0/24
- Northern Branch - Kedah: 192.168.20.0/24 and 192.168.30.0/24
- Southern Branch - Johor: 192.168.40.0/24

Headquarters: Kuala Lumpur

No.	Department	Number of network node required
1.	Sales	55
2.	Marketing	60
3.	Administration	40

Northern Branch: Kedah

No.	Department	Number of network node required
1.	Technical	20
2.	Finance	153
3.	Administration	57
4.	Information Technology	115
5.	Sales	25

Southern Branch: Johor

No.	Department	Number of network node required
1.	Administration	110
2.	Network	10

Given the above scenario, answer the following questions.

- (a) Sketch a network diagram for TiggyNet Sdn Bhd. (5 marks)
- (b) Determine the number of subnets for TiggyNet Sdn Bhd. (1 mark)
- (c) Produce a table that tabulates all the subnets. Consider the following information to be included in your table:
- Given IP
 - Subnet Address
 - Subnet Mask
 - Number of Host Supported
 - Number of Host Needed
 - Address Range
 - Broadcast Address
 - Gateway Address
 - Assigned to which department
- (12 marks)
- (d) Using your table in Q2(c), generate address configurations for the **ONE (1)** host at Kedah Branch in IT Department. (2 marks)

Q3 Construct the Hamming Code for the following bit stream (show all your work):

1111

If given,

$$\text{Number of redundancy bits } (r), 2^r \geq m + r + 1$$

where m is the number of data bit,

r is the number of redundancy bit and
even parity bit is used.

- (a) Calculate the value for r . (2 marks)
- (b) Determine the position of all the redundancy bits. (3 marks)
- (c) Calculate the values of these redundancy bits. (3 marks)
- (d) What is the final Hamming Code? (2 marks)
- (e) If the following Hamming code words are received by a receiver. Assuming that the even parity bit is used, state whether the received word is correct or wrong. If it is wrong, locate the bit position that was transmitted wrongly and write the correct Hamming code.
- (i) 1011011 (5 marks)
- (ii) 1100111 (5 marks)

- Q4** (a) List **FOUR (4)** advantages of Internet Protocol Version 6 (IPv6) against Internet Protocol Version 4 (IPv4). (4 marks)
- (b) Given the following IPv6 address that has a /48 Global Routing Prefix:
2001:00A1:2233:0001:0800:27FF:FE00:0008 /64
- (i) What is the subnet of this network address? (2 marks)
- (ii) What is the value of the Interface ID? (2 marks)
- (iii) What is the function of /64 in an IPv6 address? (2 marks)
- (c) Discuss **TWO (2)** reasons why IPv4 is still widely used in the network industries today as compared to IPv6. Justify your answer. (10 marks)

- Q5** A company has a web server, an email server and a DNS server. It has five subnets for staff in five different departments with a total of 2000 personal computers. It also has one subnet where all the servers are located. The network is also connected to the Internet. Furthermore, the corporate network where the servers are located is also connected to two nearby branches (within 1 km).

Based on the above scenario, propose a network design that applies several robust design concepts like hierarchical, redundancies and Demilitarized Zone (DMZ) firewall with an isolated server farm.

(20 marks)

- END OF QUESTIONS -

CONFIDENTIAL