TUNKU ABDUL RAHMAN UNIVERSITY OF MANAGEMENT AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

ACADEMIC YEAR 2023/2024

MAY/JUNE EXAMINATION

BMIT3084 ENTERPRISE NETWORKING

TUESDAY, 4 JUNE 2024 TIME: 9.00 AM – 11.00 AM (2 HOURS)

BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN INFORMATION SECURITY
BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN INTERNET TECHNOLOGY
BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN SOFTWARE SYSTEMS DEVELOPMENT

Instructions to Candidates:

Answer **ALL** questions. All questions carry equal marks.

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Question 1

Figure 1-1 network topology is using Internet Protocol version 4 (IPv4) addressing. Ali and you have been assigned by the company CEO to configure the company's network topology with different types of static routes. Answer the following questions to ensure successful communications between all hosts in Figure 1-1. Assume ISP router with static routing configurations have been completed.

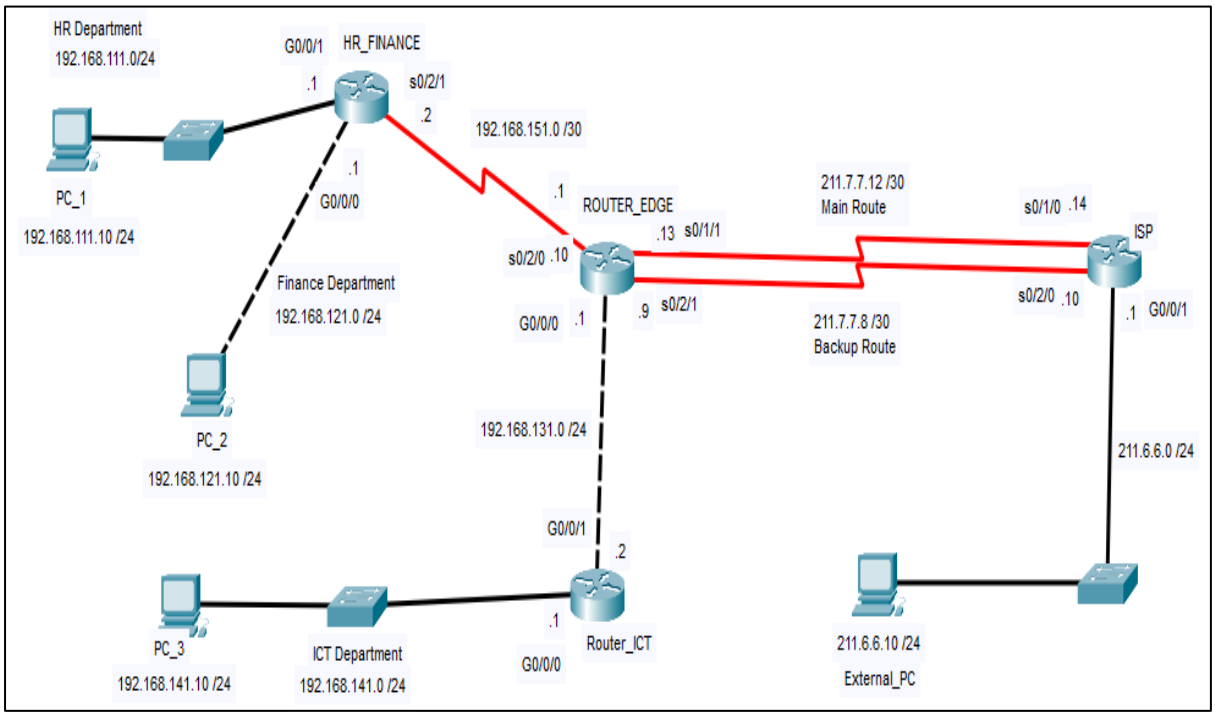

Figure 1-1: A network topology

```
ROUTER_EDGE#show ip route

Gateway of last resort is 211.7.7.14 to network 0.0.0.0

S 192.168.111.0/24 is directly connected, Serial0/2/0
S 192.168.121.0/24 [1/0] via 192.168.151.2
C 192.168.131.0/24 is directly connected, GigabitEthernet0/0/0
C 192.168.151.0/30 is directly connected, Serial0/2/0
C 211.7.7.8/30 is directly connected, Serial0/2/1
C 211.7.7.12/30 is directly connected, Serial0/1/1
```

Figure 1-2: Partial output of "show ip route"

a) In **ROUTER_EDGE**, two **standard static routes** are configured, and the partial output of show ip route command is shown in Figure 1-2. Analyse Figure 1-1 and Figure 1-2 and illustrate **TWO (2)** differences between these standard static routes. (4 marks)

b) (i) In **ROUTER_EDGE**, configure **a default static route** and **a floating default static route** using the next hop IPv4 address to forward the packets to **ISP**. State your assumption in your answer. (4 marks)

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Question 1 b) (Continued)

(ii) Explain the purpose of a **floating default static route** with reference to **ROUTER_EDGE** routing table. (4 marks)

c) (i) In **ROUTER_EDGE,** apply a **fully specified standard static route** to forward packets to **ICT Department**. (2 marks)

(ii) Explain the implementation of a **fully specified standard static route** in Question 1 c) (i). (3 marks)

d) **Open Shortest Path First (OSPF)** configurations using the network command with wildcard mask based on subnet mask are to be implemented in **R1** and **R2** routers in the network topology shown in Figure 1-3. Use OSPF **process-id 666** and **area-id 0.** Propagate the default static routes in **R2** to **R1** to forward traffic to **ISP**. Assume pre-configuration of default static route in **R2** and static routes in **ISP** have been completed. Use Table 1-1 to document your answer.

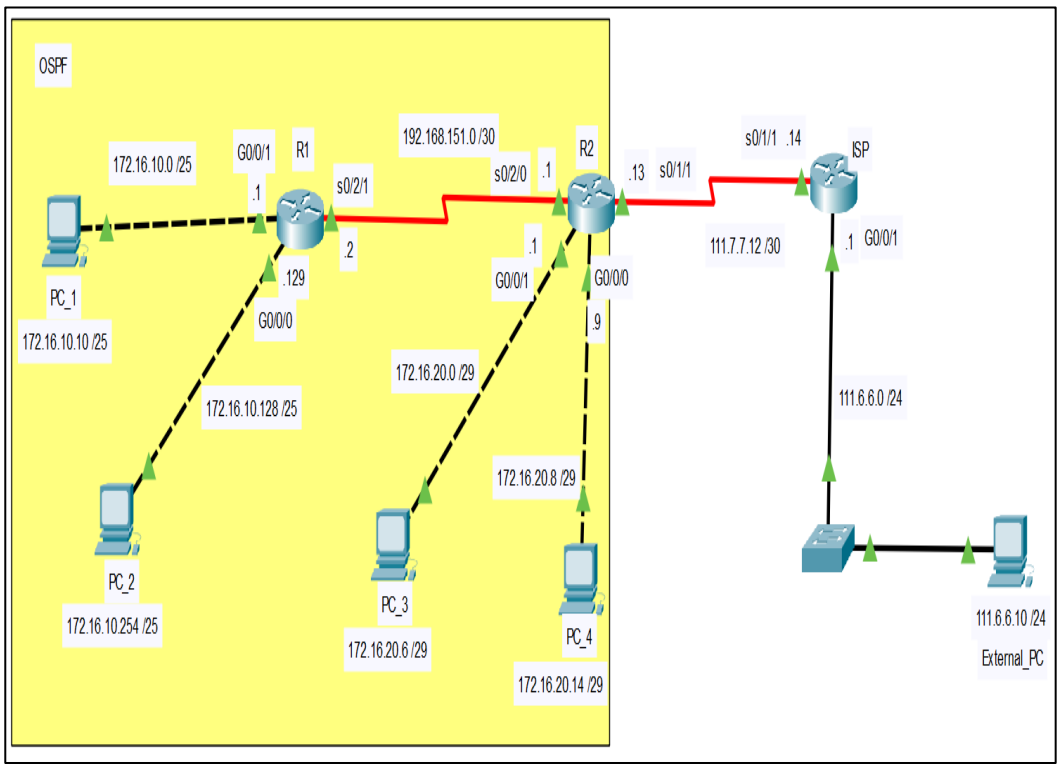

Figure 1-3: A network topology

Table 1-1: Documentation Table

Router name	Configurations

(8 marks)

[Total: 25 marks]

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Question 2

a) (i) Explain **TWO (2)** major types of Denial of Service (DoS) attacks. (4 marks)

(ii) In your opinion, a DoS or a Distributed DoS Attack (DDoS) attack is more serious to an enterprise? Justify your answers. (3 marks)

b) Figure 2-1 network topology is implemented with OSPF configurations in all routers and all PCs can communicate with each other. Analyse the network topology to implement Access Control List (ACL) to filter the network traffic and answer the following questions.

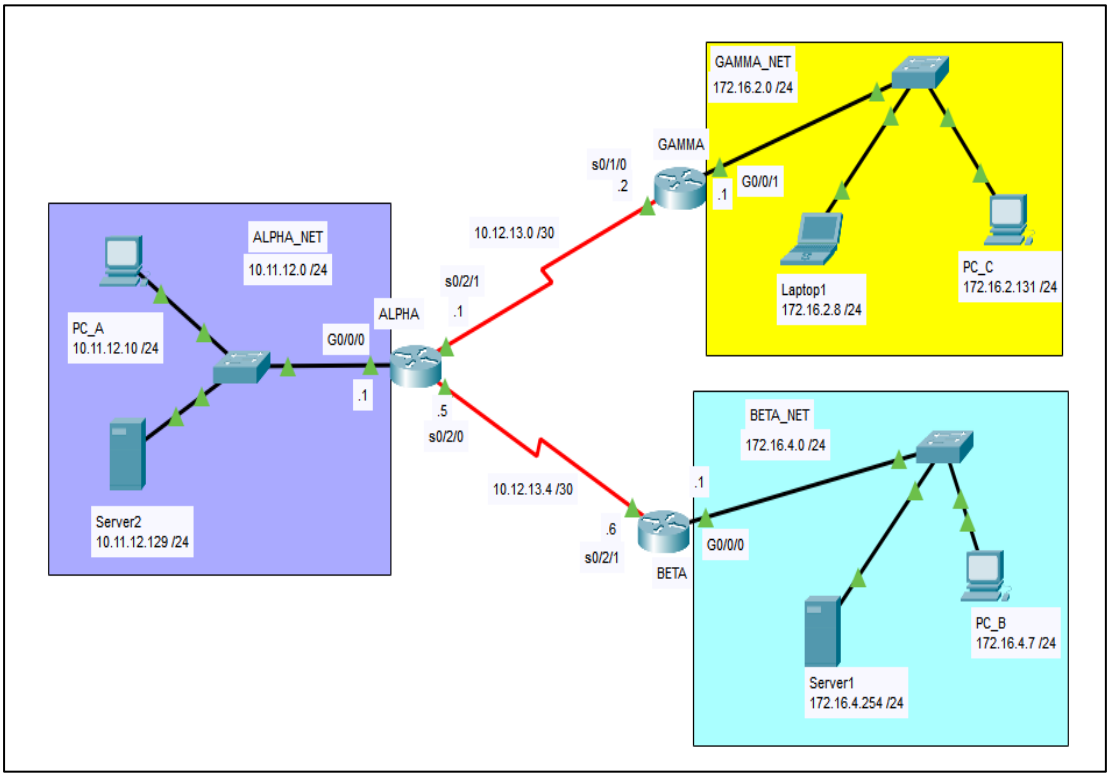

Figure 2-1: A network topology

(i) Apply a standard access list named **TELNET_ACCESS** to allow only **PC_B** to telnet into **BETA** router. Deny all other traffic which must be explicitly written in your ACL. Use suitable keyword(s) in the ACL. Indicate the router, interface, and direction to apply the ACL. (6 marks)

(ii) Apply an extended access list numbered 177 which will allow the second half of **GAMMA_NET** network to ping hosts with even numbered IP addresses in **ALPHA_NET**. The first half of **GAMMA_NET** network is able to access HTTP traffic on Server2. Deny all other traffic, which must be explicitly written in your ACL. Use **port number** for **services** and suitable keyword(s) in your ACL. Indicate the router, interface, and direction to apply the ACL. (12 marks)

[Total: 25 marks]

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Question 3

OSPF and static routing protocols are configured in the respective routers in Figure 3-1 network topology and all devices are tested to be able to communicate with each other. Analyse Figure 3-1 on DHCP (Dynamic Host Configuration Protocol) and PAT (Port Address Translation) configurations in the DHCP_NAT router.

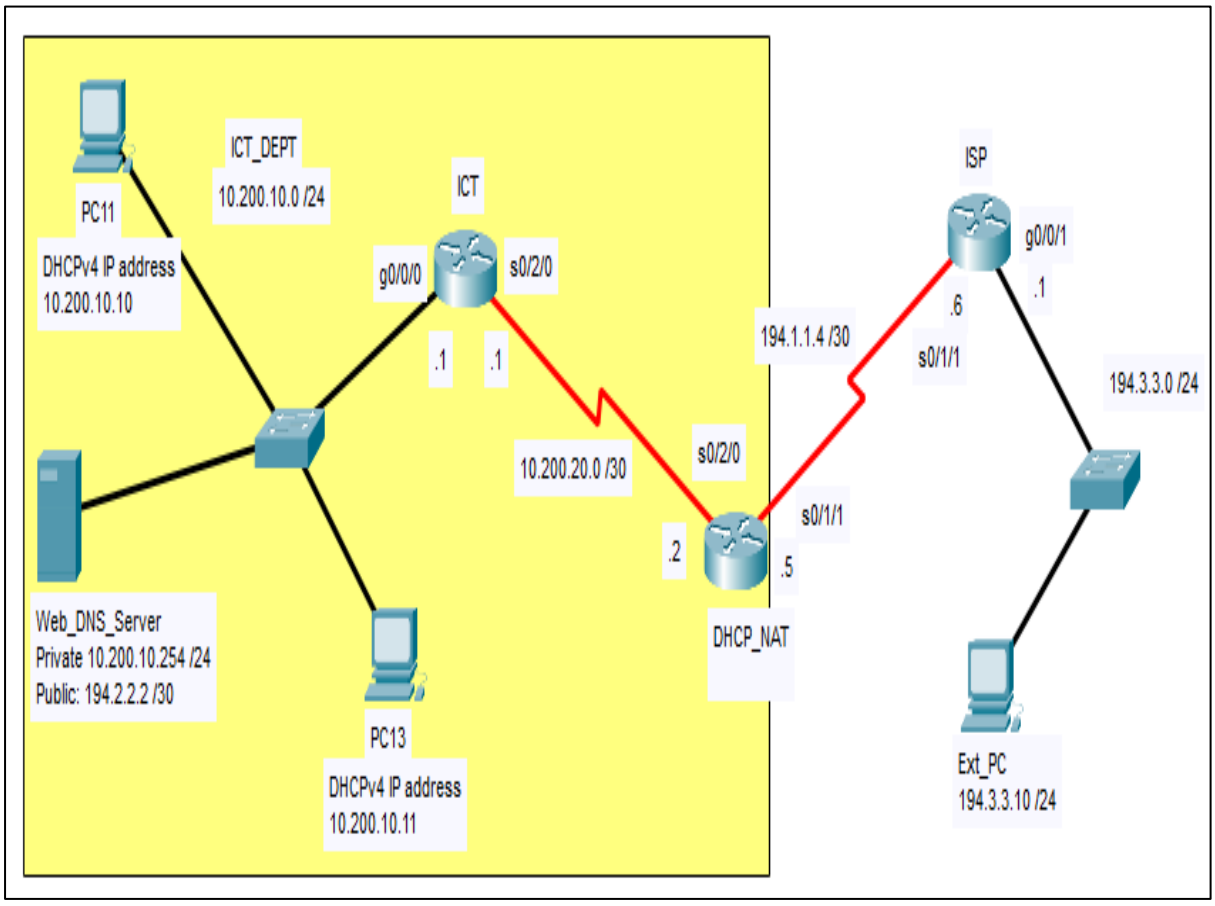

Figure 3-1: A network topology

ICT	DHCP_NAT
interface GigabitEthernet0/0/0 ip address 10.200.10.1 255.255.255.0 interface Serial0/2/0 ip address 10.200.20.1 255.255.255.252 : :	ip dhcp pool ICT_DEPT dns-server 10.200.10.254 interface Serial0/1/1 ip address 194.1.1.5 255.255.255.252 interface Serial0/2/0 ip address 10.200.20.2 255.255.255.252 access-list 9 permit 10.200.10.0 0.0.0.255 : :

Figure 3-2: Partial output of "show run" commands

Question 3 (Continued)

a) **DHCP_NAT** router is configured as a DHCP server. PC11 is having a problem obtaining the IP addresses and other DHCP configurations successfully. Analyse the partial output of "show run" commands in Figure 3-2 and network topology in Figure 3-1. Use Table 3-1 to document all errors, provide the solutions/correct configurations for the respective errors and lastly justify your answers. State your assumptions in your answers. (9 marks)

Table 3-1: Documentation Table

Errors	Solutions	Justifications

b) (i) Implement a Static NAT configuration for the **Web_DNS_Server** to be reachable from the Internet. A public address **194.2.2.2/30** is assigned to the **Web_DNS_Server** from the external network address of **194.2.2.0/30**. (7 marks)

(ii) Examine Figure 3-1 and Figure 3-2. Identify errors and provide solutions for PAT configurations to use the **remaining** public IP address from the external network address **194.2.2.0/30** as the pool of address. All the internal PCs should be able to ping the **Ext_PC**. Use Table 3-2 to document your answers. (6 marks)

Table 3-2: Documentation Table

Errors	Solutions

c) Explain NAT64. (3 marks)

[Total: 25 marks]

Question 4

a) New technologies continue to emerge in networking. Propose **TWO (2)** modern WAN (Wide Area Network) connectivity options for an enterprise and explain your answers. (6 marks)

b) (i) Virtual Private Networks (VPNs) is another technology for communications on the network. Illustrate the differences between Enterprise VPNs and Service Provider VPNs. (6 marks)

(ii) Compare IPsec (Internet Protocol Security) and SSL (Secure Sockets Layer) VPNs in terms of applications supported, authentication strength and connection complexity. (6 marks)

Question 4 (Continued)

c) (i) Differentiate traffic shaping and traffic policing. (4 marks)

(ii) Explain a QoS (Quality of Service) method that is not suitable for VPN traffic. (3 marks)

[Total: 25 marks]