00654

Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 2, Semester 1 (2022)

IT2050 – Computer Networks

Duration: 3 Hours

June 2022

Instructions to Candidates:

- This paper has 5 questions.
- Answer all questions in the booklet given.
- The total marks for the paper is 100.
- This paper contains 9 pages, including the cover page.
- Electronic devices capable of storing and retrieving text and mobile phones are not allowed.
- Calculators are allowed.

Question 1 — 20 Marks

I) Compare the Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). [4 marks]

II) Briefly explain the three fields in TCP header which are required to provide reliable data transmission? [6 marks]

III) What are the fields in the ~~TCP~~ IP header that change when a PDU travels from one router to another? [2 marks]

IV) The following figure (Figure 1) shows the content of the header of an IP Packet/ Datagram.

4A00 012C 000B 0000 1006 0000 7C4B 0306 B40C 0F01 ....

VER	HLEN	Service type	Total length
Identification		Flags	Fragmentation offset
Time to live	Protocol		Header checksum
Source IP Address 32 bits			
Destination IP Address 32 bits			
Options			

IP Header

Figure 1

a) Find the size of the IP header? (in Bytes) [1 Mark]
b) Find the size of the Option field? (in Bytes) [1 Mark]
c) Find the size of the Data field? (in Bytes) [2 Marks]
d) How many more routers can the IP packet Pass? [2 Marks]
e) Find the identification number of the packet? [2 Marks]

Question 2 — 20 Marks

I) A TCP client opens a connection with a server using an initial sequence number (ISN) of 6500. The server opens the connection with an ISN of 1100. The following segments are sent by the client and the server respectively:

Table 1

Client	Server
500 Bytes	
	3000 Bytes
100 Bytes	

Show the TCP segments during the connection establishment process, data transmission and connection termination process. Include Sequence Numbers and Acknowledgement Numbers. [6 Marks]

II) Using a diagram, explain how Persistence Timer solve the problem related to zero window size advertisement? [4 marks]

III) Referencing to the following diagram in figure 2, name the states labeled as 1 to 10. (Use numbers 1 to 10 in your answer script). [10 marks]

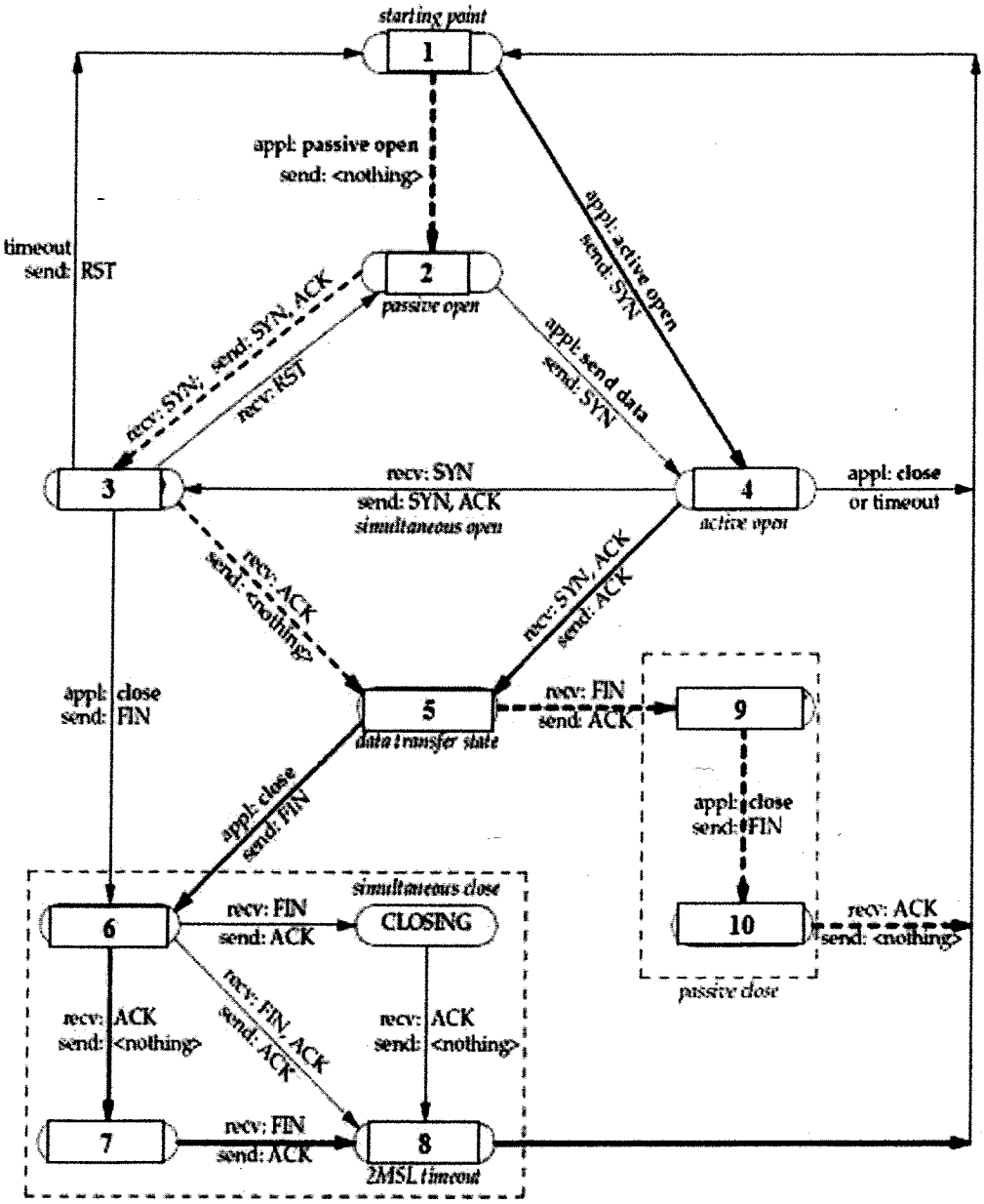

Figure 2 : TCP state Transition Diagram.

Question 3 **20 Marks**

I. An organization has obtained the IP address block 195.10.20.0/24 and there is a requirement to create 11 subnets as follows:

2 subnets with 60 addresses in each.

2 subnets, with 30 addresses in each.

3 subnets with 10 addresses in each

4 subnets with 2 addresses in each.

Write down all the subnetwork addresses with the subnet masks using Variable Length Subnet Masking. [10 Marks]

II. Write the three types of IPv6 addresses. [3 Marks]

III. What is the EUI-64 interface ID of the IPv6 address corresponding to the MAC address 6CA5: BFFE:024C. [2 Marks]

IV. Write down the complete IPv6 addresses of the following compressed IPv6 addresses. [2 Marks]

a) 64:6A30:0:2345::190
b) Fe80::1

V. Write down the three methods of IPv4 and IPv6 coexistence. [3 Marks]

Question 4 — 20 Marks

I. Consider the network diagram with Cisco devices illustrated in Figure 3. Write the commands to perform the following tasks. Indicate the relevant command prompt in your answer.

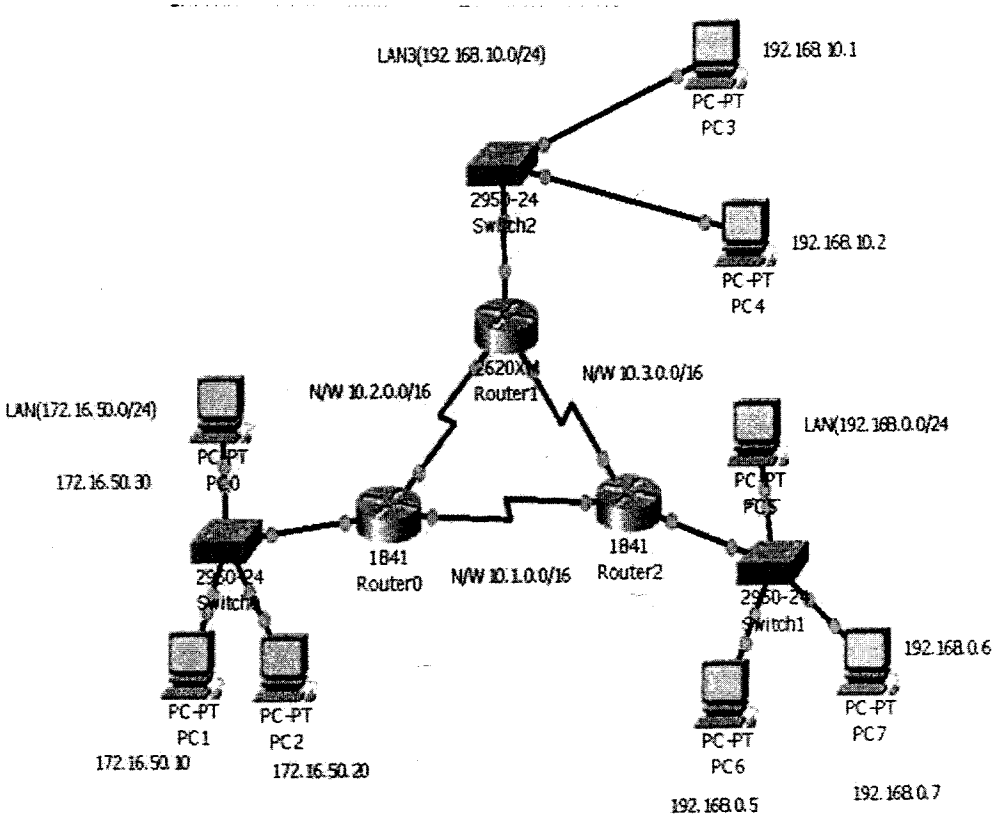

Figure 3: Autonomous Network System.

a) From user mode of Router1, entry to the privilege mode. [1 mark]

b) Entry to the configuration mode of Router1 [1 mark]

c) Change the hostname of Router1 as 'KANDY'. [1 mark]

d) Configure a user level password and privilege level password for Router1. [2 marks]

e) Configure a suitable IP address to the 'serial 0' interface and configure the clock rate as 200000 to the same interface in Router1. [2 marks]

f) Assume that 'Ethernet 0' interface is already configured. Configure EIGRP on Router1. Autonomous System No: 212. [3 marks]

g) Display the existing configuration of Router and save it in the NVRAM [2 marks]

II. Explain the usage of Autonomous System number in EIGRP. [1 mark]

III. Compare Distance Vector routing protocol and Link State routing protocol. [4 marks]

IV. Which type of routing protocol is best suited for the network shown in Figure 3? Justify your answer. [3 marks]

Question 5 — 20 Marks

I. Explain are ***the additional parameters*** used by Extended Access Control Lists when compared to Standard Access Control Lists. [2 Marks]

II. A network administrator wants to implement ACL security considering the following requirements for the network shown in Figure 4.

a) Ron cannot access the Web server in Sheffield Network.

b) Harry cannot access Telnet Server in Manchester Network, but he can access all the other servers and computers in Manchester Network.

c) Ginny is not allowed to access any well-known server in outside networks.

i. Select the most suitable routers to configure Access Control Lists to satisfy the above requirements and write down the ACLs indicating the name of router. [6 marks]

ii. Select the most suitable interfaces to apply the above ACLs and write down commands to apply them. Indicate the router and interface with your commands. [3 marks]

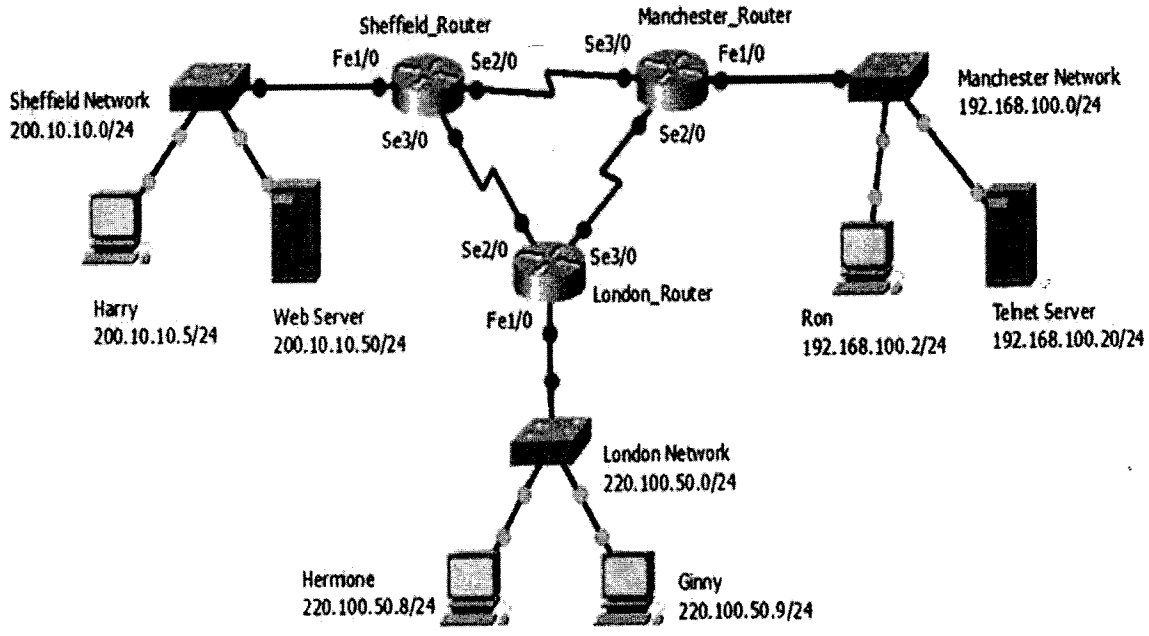

Figure 4

III. Network administrator configured the following ACL statements. Explain what will happen after the following configurations are executed? [4 Marks]

London_Router(config)#access-list 120 deny ip host 220.100.50.9 host 200.10.10.5
London_Router(config)#interface fastEthernet 1/0
London_Router(config-if)#ip access-group 120 in

IV. What are the advantages of Named ACL over Standard ACL? [2 Marks]

V. What is the advantage of De-Militarized Zone? [2 Marks]

VI. Name two types of servers placed in DMZ? [1 Mark]

End of the paper