00568

Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 2, Semester 1 (2023)

IT2050 – Computer Networks

Duration: 3 Hours

May-June 2023

Instructions to Candidates:

- This paper has 5 questions.
- Answer all questions in the booklet given.
- The total mark for the paper is 100.
- This paper contains 6 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. Compute the EUI-64 interface ID of the IPv6 address corresponding to the MAC address EFFE:ABCD:B431 *(3 Marks)*

II. What are the advantages of using Variable Length Subnet Masks.? *(3 Marks)*

III. What are the two rules for shortening the IPv6 addresses? *(2 Marks)*

IV. An organization has obtained the IP address block 220.30.40.0/24, and there is a requirement to create 10 subnets as follows:

2 subnets with 50 addresses in each.

2 subnets, with 25 addresses in each.

3 subnets with 10 addresses in each

3 subnets with 2 addresses in each.

Compute the subnetwork addresses with the subnet masks using VLSM approach. *(12 Marks)*

Question 2) (20 marks)

I. What are the requirements for having redundant links from one LAN segment to another? What sort of problems will occur with the redundant links? *(2 marks)*

II. Write down the steps in Spanning Tree Algorithm *(4 marks)*

III. Draw a suitable switched network with redundant links and explain the operation of the Spanning Tree Algorithm using that network. Indicate port/interface status in your diagram. *(12 marks)*

IV. Briefly explain the relationship between Path Cost Values in STP and Bandwidth. *(2 marks)*

Question 3) (20 marks)

I. Compare Distance Vector Routing and Link State Routing protocols. *(4 marks)*

II. Consider the network diagram given below, which comprises of Cisco devices. Write down the commands used to perform the following tasks. Indicate the relevant command prompt in your answer.

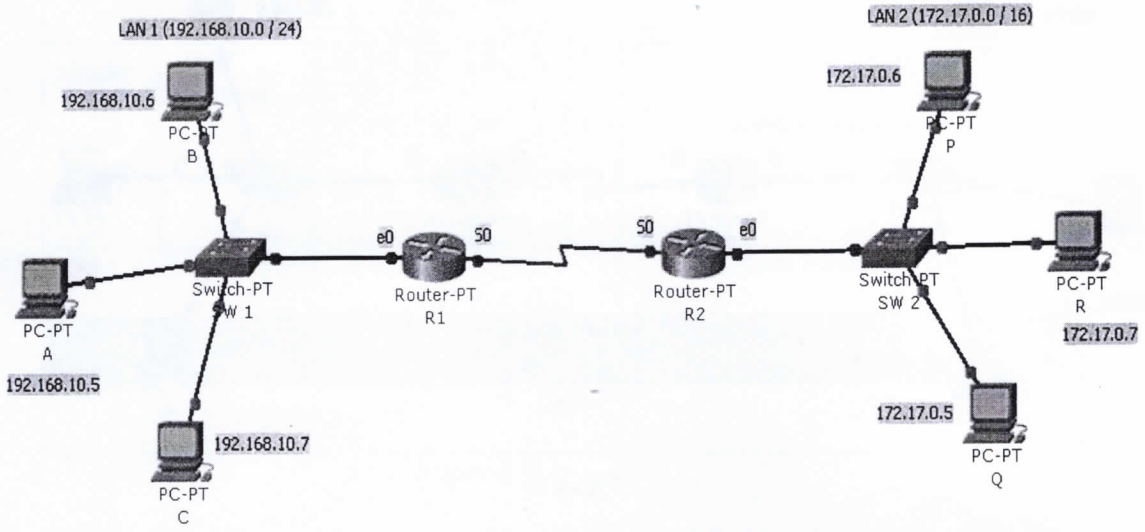

Figure 1

a. From user mode of R2, entry to the privilege mode of R2. *(1 mark)*

b. Entry to the configuration mode of R2 *(1 mark)*

c. Change the hostname of R2 to 'CMBRouter'. *(2 marks)*

d. Configure the privilege level SECRET password for R2. *(2 marks)*

e. Configure a suitable IP address to the 'serial 0' interface and configure the clock rate as 64000 to the same interface in R2. *(3 marks)*

f. Assume that 'Ethernet 0' interface is already configured. Configure dynamic routing in R2. Use RIP as the routing protocol. *(3 marks)*

g. What is the command to verify the configuration you did? *(2 marks)*

h. Save the configuration to the TFTP server. *(2 marks)*

Question 4 (20 Marks)

I. Compare and contrast Standard Access Control Lists and Extended Access Control Lists with respect to the layer three protocol (Ex. IP) and layer four protocol (Ex. TCP, UDP). *(4 marks)*

II. The network administrator wants to implement ACL security for the following requirements for the network given in Figure 2. (Assume EIGRP has been configured as the routing protocol.)*(12 marks)*

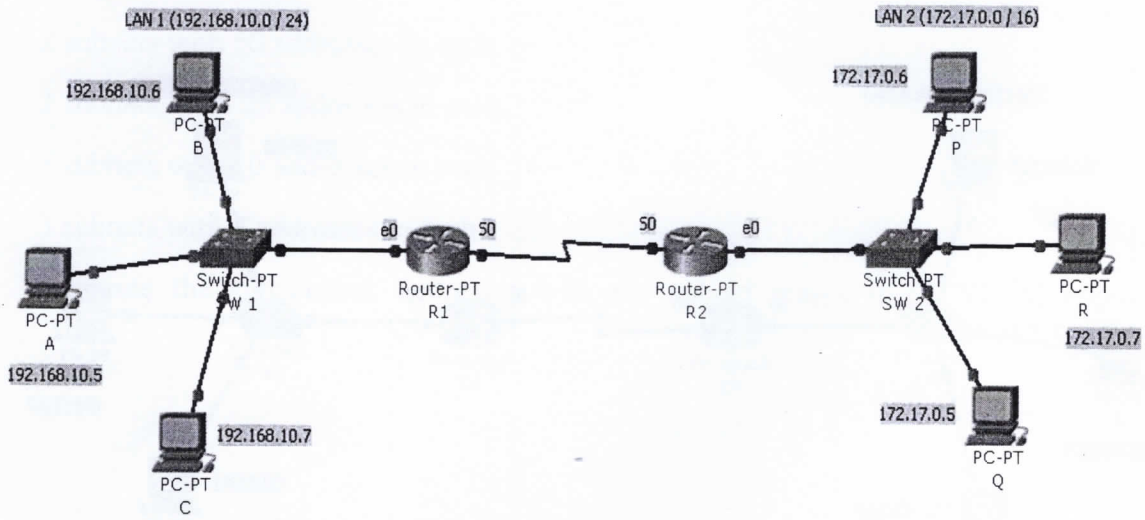

Figure 2

a) Host B is not allowed to access the web server in host P in LAN 2. However other hosts in LAN 1 can access the web server in LAN 2.

b) Host P is allowed to telnet any host in LAN 1. However host P is not allowed to access any other servers in LAN1.

c) Any unspecified communication should be not allowed.

Select the most suitable routers and configure Access Control Lists for the above requirements. Apply them to the most suitable interfaces. Show the router prompts s in your configuration.

III. Compare Standard Access Control Lists and Named Access Control Lists. *(4 marks)*

Question 5 (20 Marks)

I. The following Figure 3 shows the content of the header of a TCP Segment.

←

1327 0015 0000 0056 0000 0024 7030 0050 0000 0200

Source Port Number (16 Bits)								Destination Port Number (16 Bits)
Sequence Number (32 Bits)								
Acknowledgement Number (32 Bits)								
Header Length (4 bits)	Reserved Bits (6)	U R G	A C K	P S H	R S T	S Y N	F I N	Window Size (16 Bits)
Checksum (16 Bits)								Urgent Pointer (16 Bits)
Options & Paddings								
Data								

Figure 3

Answer the following questions. *(Mention the base, if it is not in decimal. Ex: Hex or bin)*

a. Compute the header size. *(2 marks)*

b. Compute the number of bytes in the Options field. *(2 marks)*

c. Write three types of Options available in TCP header. *(3 marks)*

d. What can you say about this TCP segment by observing the values of six different Control fields (flags)? *(3 marks)*

e. Draw a diagram by illustrating URG control field, Urgent Pointer, Sequence number and Data. *(4 marks)*

f. How many bytes of urgent data are available ? *(3 marks)*

g. What is the well-known server process connected by this TCP segment. *(3 marks)*

USEFUL COMMANDS FOR DATACOMMUNICATIONS AND COMPUTER NETWORKS II

Standard IP Access List and Extended Access list Configuration Commands

Command	Configuration Mode and Description
access-list *access-list-number* { **deny** | **permit** } *source* [*source-wildcard*] [**log**]	Global command for standard numbered access lists
access-list *access-list-number* { **deny** | **permit** } *source* [*source-wildcard*] *destination* [*destination-wildcard*] [**log**]	Global command for extended numbered access lists
ip access-group { *number* | *name* [**in** | **out**]}	Interface subcommand to enable access lists
access-list *access-list-number* {permit | deny} protocol *source source-wildcard* [operator port] *destination destination-wildcard* [operator port] [established] [log]	Extended IP Access-list configuration
ip access-group *access-list-number* {in | out}	Activates the extended list on an interface