02308

Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 2, Semester 1

IT2050 – Computer Networks

Duration: 2 Hours

November 2023

Instructions to Candidates:

- This paper has 4 questions.
- Answer all questions in the booklet given.
- The total mark for the paper is 100.
- This paper contains 7 pages, including the cover page.
- Electronic devices capable of storing and retrieving text and mobile phones are not allowed.
- Calculators are allowed.
- A router/switch configuration command reference is given in the Annex.

Question 1) **(25 marks)**

a) List three types of IPv6 addresses, giving an example for each type. *(6 Marks)*

b) Write two rules to simplify an IPv6 address. *(2 Marks)*

c) Write down the three methods of IPv4 and IPv6 coexistence. *(3 Marks)*

d) Compute the EUI-64 interface ID of the IPv6 address corresponding to the MAC address CA: 10: 20: AC: 90: 4B *(2 Marks)*

e) An organization has obtained the IP address block 205.60.30.0/24 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 12 addresses in each

3 subnets with 2 addresses in each.

Compute the subnetwork addresses with the subnet masks using Variable Length Subnet Masking. *(12 Marks)*

Question 2) (25 marks)

Consider the network diagram with Cisco devices illustrated in Figure 1. Write the commands to perform the following tasks. Indicate the relevant command prompt in your answer.

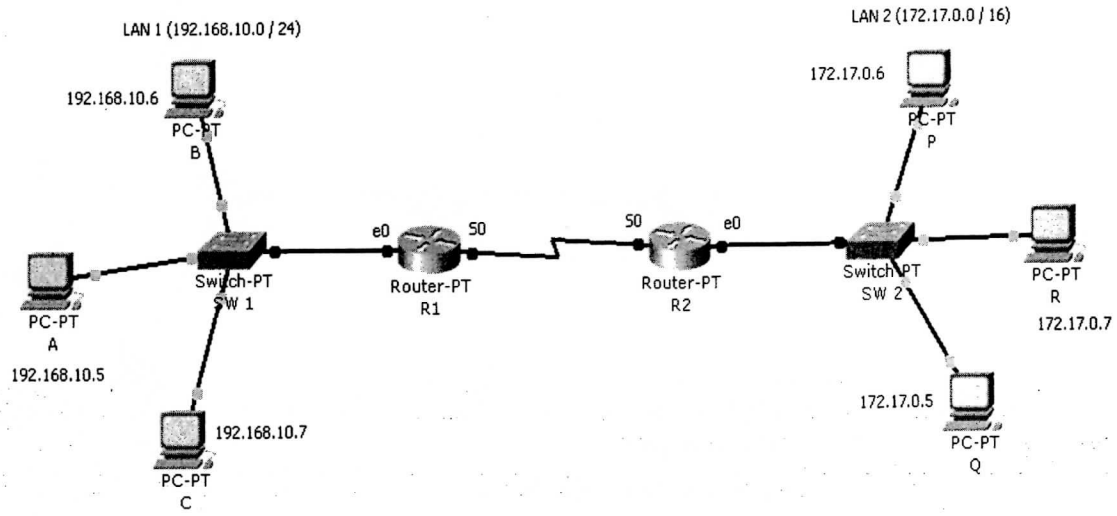

Figure 1

a. From the user mode of R2, entry to the privilege mode of R2. *(2 marks)*

b. Entry to the configuration mode of R2 *(2 marks)*

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

d. Configure the privilege level password for R2. *(3 marks)*

e. Configure a suitable IP address to the 'S 0' interface and configure the clock rate as 200000 to the same interface in R2. *(4 marks)*

f. Assume that 'e 0' interface is already configured. Configure dynamic routing in R2. Use EIGRP as the routing protocol. (AS=100) *(4 marks)*

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

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

i. Propose IPv6 address plan for LAN 1 and 2. *(4 marks)*

Question 3) (25 marks)

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

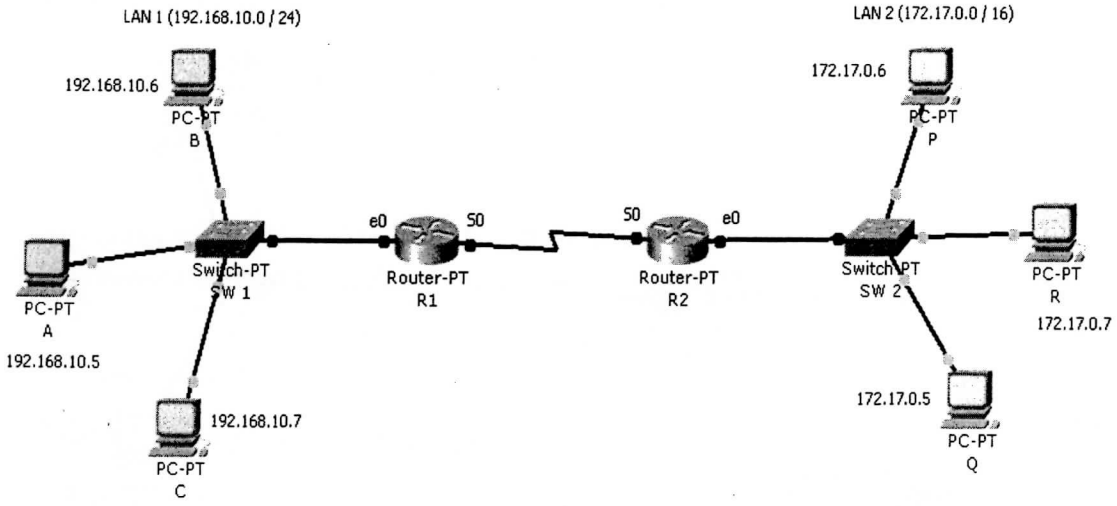

Figure 2

i. Host A is not allowed to telnet to the host P in LAN 2. However, other hosts in LAN 1 can telnet to the host P in LAN 2.

ii. Host P is allowed to access any web server (port 80) in LAN 1. However, host P is not allowed to access any other servers in LAN1.

iii. Any unspecified communication should be not allowed.

Select the most suitable routers and configure Access Control Lists for the above requirements. Apply them to most suitable interfaces. Specify the configuration mode in which each command should be entered?

b) The following Figure 3 shows a switched network, and it uses Spanning Tree Protocol. The Bridge IDs of each switch and the path costs are given in the diagram. Draw this diagram in your answer booklet and answer the following questions.

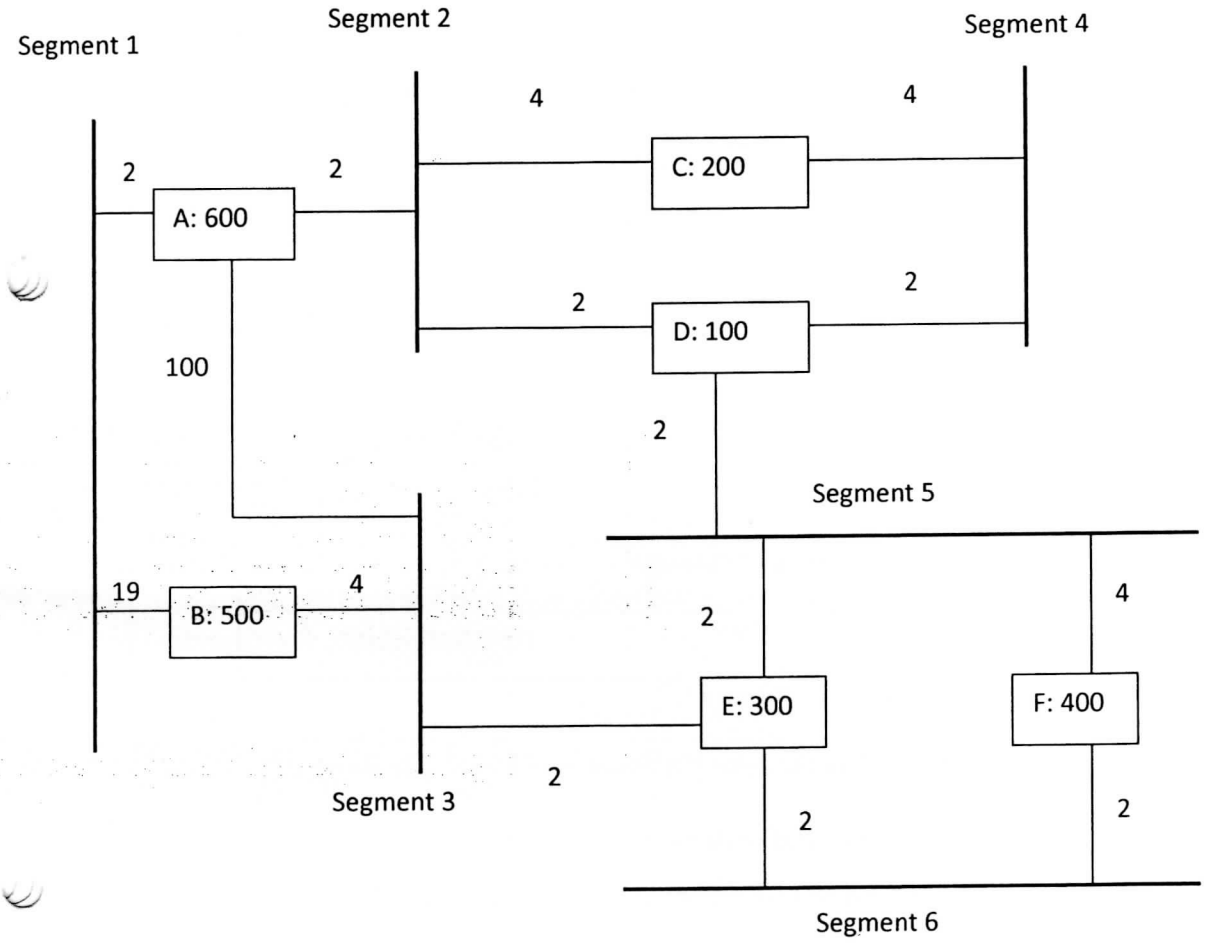

Figure 3

i. Mark the Root Bridge in the diagram. *(2 marks)*

ii. Select and name the Root Port of each bridge as RP. *(2.5 marks)*

iii. Mark the designated Bridge for each segment. *(2 marks)*

iv. Name the designated port in each designated bridge as DP. *(2.5 marks)*

v. If selected Root Bridge is not working, then which is the next root bridge? Explain the method it is selected using Spanning Tree Protocol? *(4 marks)*

Question 4 (25 Marks)

The following Figure 4 shows the content of the header of a TCP Segment and the format of the header.

1455 0017 0000 0000 0000 0036 B030 0200 0000 0060

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 4

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

a. Compute the size of header and option field in Bytes. *(4 marks)*

b. What can you say about this TCP segment by observing the port numbers? *(4 marks)*

c. What can you say about this TCP segment by observing the values of six control fields (flags)? *(4 marks)*

d. Draw a diagram illustrating URG control field, Urgent Pointer, Sequence number and Data. *(5 marks)*

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

f. Prove that TCP is reliable based on the fields of TCP header. *(5 marks)*

Annex: Command Reference

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