



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

June 2024

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 4 pages, including the cover page.
- ◆ Electronic devices capable of storing and retrieving text and mobile phones are not allowed.
- ◆ Calculators are allowed.
- ◆ An additional 10 minutes of reading time is provided prior to the examination commencement.

Question 1)**(25 marks)**

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

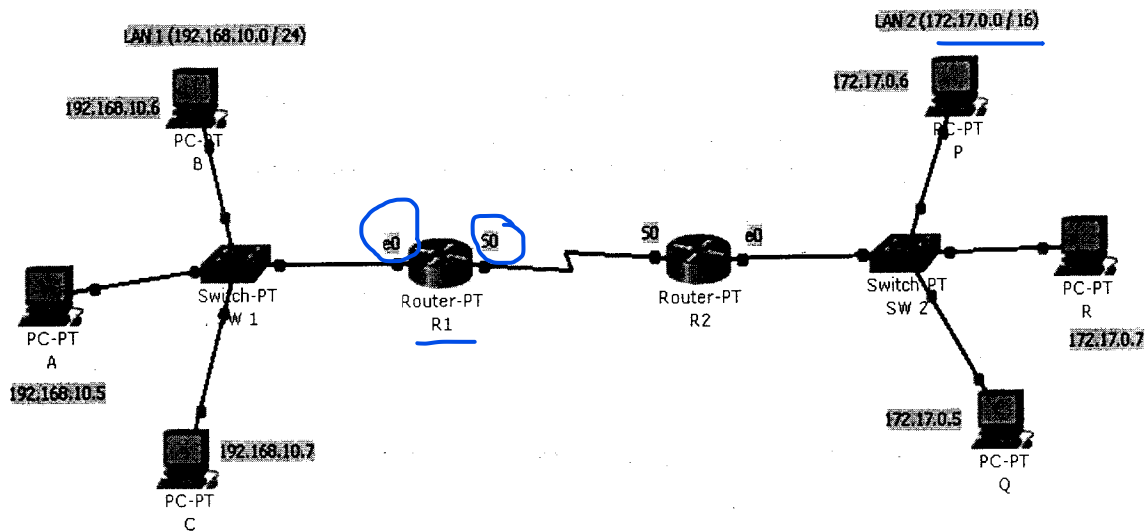


Figure 1

- From the user mode of R1, entry to the privilege mode of R1. (2 marks)
- Entry to the configuration mode of R1 (2 marks)
- Change the hostname of R1 to 'Metro'. (2 marks)
- Configure an Encrypted privilege level password for R1. (3 marks)
- Configure a suitable IP address for the 'serial 0' interface of R1 based on the Network Addresses given in the diagram, configure the clock rate as 200000 for the same interface, and activate the interface. (5 marks)
- Assume that 'Ethernet 0' interface of R1 is already configured. Configure dynamic routing in R1, using IGRP as the routing protocol. (AS number =100) (5 marks)
- Verify the configuration changes you have done above. (3 marks)
- Save the configuration to NVRAM. (3 marks)

Autonomous system
number

Question 2)**(25 marks)**

- a) An organization has obtained the IP address block 197.67.37.0/24 and there is a requirement to create 10 subnets as follows. Compute the subnetwork addresses with the subnet masks using Variable Length Subnet Masking (VLSM) (12 Marks)
- 2 subnets with 40 addresses in each.
 - 2 subnets, with 20 addresses in each.
 - 3 subnets with 10 addresses in each
 - 3 subnets with 2 addresses in each.
- b) Propose an IPv6 address plan for the network diagram shown in Figure 1. You may draw a similar diagram in your answer script and write IPv6 addresses on it. (9 Marks)
- c) State two rules to simplify an IPv6 address, giving an example for each rule. (4 Marks)

Question 3)**(25 marks)**

- a) Compare and contrast Distance Vector Routing protocols and Link State Routing protocols with examples of routing protocols. (6 Marks)
- b) Compare and contrast the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP). (6 marks)
- c) A TCP client opens a connection with a server using an initial sequence number (ISN) of 5100. The server opens the connection with an ISN of 8500. The following segments are sent by the client and the server respectively.

Client	Server
100 Bytes	
	5000 Bytes

Show the flow of TCP segments in a timing diagram during the connection establishment, data transmission and connection termination phases, showing the Sequence Numbers and Acknowledgement Numbers for each segment. (9 Marks)

- d) Indicate the TCP state transitions of both the client and the server in the timing diagram above, clearly showing the event that causes each transition. (4 Marks)

Question 4**(25 Marks)**

Figure 2 shows the content and the format of a TCP Segment.

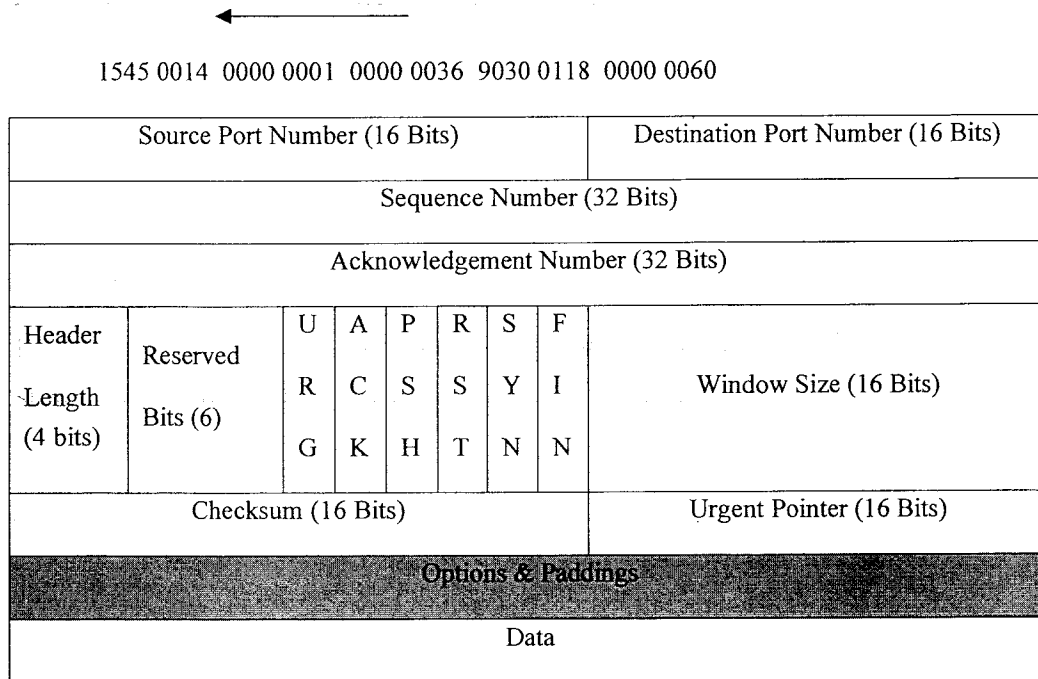


Figure 2

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)