Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 2, Semester 1 (2019)

IT2050 – Computer Networks

Duration: 3 Hours

October 2019

Instructions to Candidates:

- This paper has 4 questions.
- Answer all questions in the booklet given.
- The total marks 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

Question 1   [25 Marks]

a) Compare the differences between Transmission Control Protocol (TCP) and User
   Datagram Protocol (UDP).   (2 marks)
b) What fields in TCP header are required to provide reliable data transmission? (2 marks)
c) Describe how UDP provides a faster data transmission.   (2 marks)
d) Using a diagram, explain how Persistence Timer solves the problem related to zero
   window size advertisement?   (2 marks)
e) A client sends a segment at the time 10:10:10. It receives the acknowledgement at
   10:10:20. What is the Set value for RTT if the previous RTT was 8 seconds? Calculate the
   Re-transmission Timer value? (*Set RTT = α x Previous RTT + (1-α) Current RTT*)
   Consider α as 90%.   (4 marks)
f) The following is a dump of a TCP header in hexadecimal format.

   ←——

   AC05 0014 0000 00A5 0000 0A01 A012 0800 0000 0000

   i.   State the destination port number and the server protocol.   (2 Marks)
   ii.   State the type of the source port.   (2 Marks)
   iii. State the sequence number.   (1 Mark)
   iv.   Calculate the header size and the window size.   (2 Marks)

g) A TCP client opens a connection with a server using an initial sequence number (ISN) of
   32500. The server opens the connection with an ISN of 15700. The following segments
   are sent by the client and the server respectively.

Sent Time	Client	Server
13:08:52	1000 Bytes	
13:09:26		500 Bytes

   Show the TCP segments during the connection establishment process, data transmission
   and connection termination process. Include Sequence Numbers and Acknowledgement
   Numbers.   (6 Marks)
h) What is the state of the TCP client when it is transmitting data?   (1 Mark)

Question 2   [25 Marks]

XYZ Company has been given the network address 200.100.10.0/24. The company needs four
separate network addresses for four departments and each department requires the IP addresses as
shown in the following Table 1.

Table 1

Department	Required IP Addresses
IT	120
Purchasing	30
Sales	30
HR	30

a) Recommend an IP address plan for the above requirements by using VLSM concept by indicating all the calculations. (12 marks)
b) Briefly explain the three options available for migration from IPv4 to IPv6. (6 marks)
c) List three types of IPv6 addresses. (3 marks)
d) IEEE defined Extended Unique Identifier (EUI) (or 64 bit interface ID) is generated using the MAC address of the host. Using the following MAC address, illustrate how the 64-bit Interface ID is generated.

<div align="center">000A.F382.98C6</div> (4 marks)

Question 3 [25 Marks]

a. Briefly explain the purpose of the following fields of the IP header.
   i.   HLEN   (6*2marks)
   ii.   DF bit (Don't fragment)
   iii.   MF bit (More fragment)
   iv.   Fragmentation offset
   v.   TTL
   vi.   Header checksum

b. Briefly explain the function of Spanning Tree Protocol. (3 marks)

c. Following diagram shows a switched network. Bridge IDs of each switch and the path costs are given in the diagram. *(draw this diagram in your answer booklet)*
   i.   Mark the Root Bridge in the diagram. (2 marks)
   ii.   Select and name the Root Port of each bridge as RP. (3 marks)
   iii.   Select the designated Bridge for each segment (2 marks)
   iv.   Select and name the designated port in each designated bridge as DP.
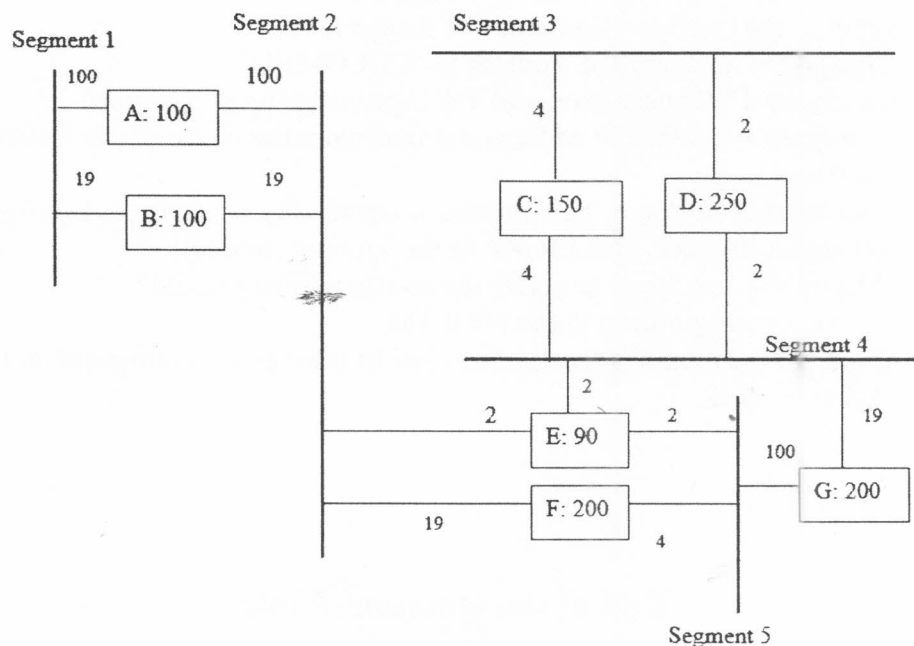   (3 marks)

Figure 1: Switch / Bridge Network

Question 4 [25 Marks]

Consider the network diagram of Autonomous System 215 shown in figure 4 and write the commands / configurations for the following questions. You need to mention the router prompt whenever necessary.
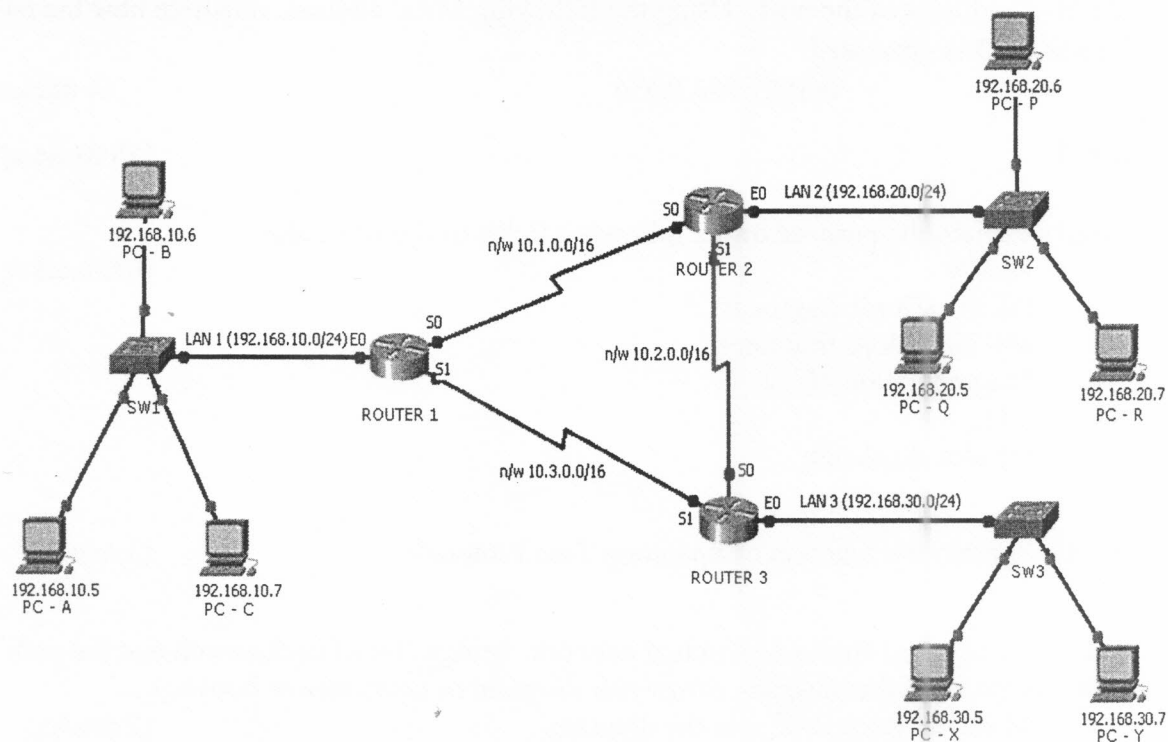

Figure 4: Network Diagram

a. From user mode, enter to the privilege mode of Router1. (2 marks)
b. Enter to the configuration mode of Router1. (2 marks)
c. Change the hostname of Router1 to 'COLOMBO'. (2 marks)
d. Configure TWO user level and TWO privilege level passwords. (4 marks)
e. Configure a suitable IP address and configure the clock rate as 64000 to 'S0' interface . (4 marks)
f. Assume that 'E0' and 'S1' interfaces are already configured. Configure dynamic routing in Router1. Use EIGRP as the routing protocol. (4 marks)
g. What is the command to verify the configuration you did? (2 marks)
h. Save the configuration to the NVRAM. (2 marks)
i. What are the methods that can be used to recover the configuration file if the router crashes. (3 marks)

End of the Question Paper.