UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	COMPUTER NETWORKS
COURSE CODE	:	BEC41003
PROGRAMME	:	BEJ
EXAMINATION DATE	:	DECEMBER 2019/JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTIONS	:	ANSWER **ALL** QUESTIONS.

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 (a) (i) List two access technologies. Classify each one as home access or enterprise.

(2 marks)

(ii) Compare the difference between network architecture and application architecture.

(3 marks)

(iii) Describe two reasons for using layered protocols.

(3 marks)

(b) An image is 1600 x 1200 pixels with 3 bytes/pixel. Assume the image is uncompressed. Calculate the execution time to transmit it over a 56-kbps modem channel.

(i) Over a 1-Mbps cable modem.

(4 marks)

(ii) Over 100-Mbps Ethernet.

(3 marks)

(c) Consider the RDT 3.0 protocol. Establish a diagram showing that if the network connection between the sender and receiver can reorder messages, two messages propagating in the medium between the sender and receiver can be reordered, then the alternating-bit protocol will not work correctly. Your diagram should have the sender on the left and the receiver on the right, with the time axis running down the page, showing data (D) and acknowledgment (A) message exchange. Make sure you indicate the sequence number associated with any data or acknowledgment segment.

(5 marks)

Q2 (a) (i) Compare the difference between a permanent address and a care-of address.

(4 marks)

(ii) Determine who assigns a care-of address.

(3 marks)

(b) Propose the three(3) approaches that can be taken to avoid having a single wireless link degrade the performance of an end-to-end transport-layer TCP connection.

(6 marks)

(c) (i) If a node has a wireless connection to the Internet, does that node have to be mobile? Explain you justification.

(3 marks)

(ii) Suppose that a user with a laptop walks around her house with her laptop, and always accesses the Internet through the same access point. Distinguish, is this user mobile from a network standpoint?

(4 marks)

Q3 (a) **Figure Q3(a)** depicts two clients communicate with the same Web Server application.

(i) Determine the source and destination port values in the segments flowing from the server back to the clients' processes.

(6 marks)

(ii) Determine the source and destination IP addresses in the network-layer datagrams carrying the transport-layer segment.

(6 marks)

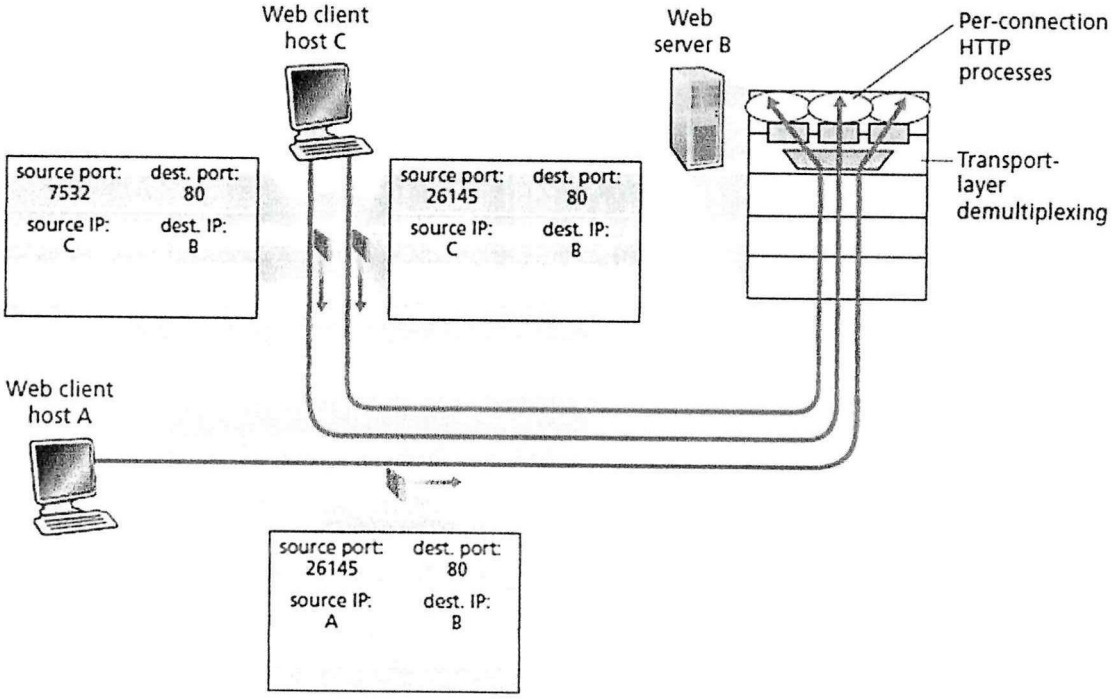

Figure Q3(a)

(b) In modern packet-switched networks, including the Internet, application-layer messages will be chunk into smaller packets and sends the packets into the network. The receiver then reassembles the packets back into the original message. We refer to this process as message segmentation. **Figure Q3(b)** illustrates the end-to-end transport of a message with and without message segmentation. Consider a message that is 8×10^6 bits long that is to be sent from source to destination in **Figure Q3(b)**. Suppose each link in the **Figure Q3(b)** is 2 Mbps. Ignore propagation, queuing, and processing delays.

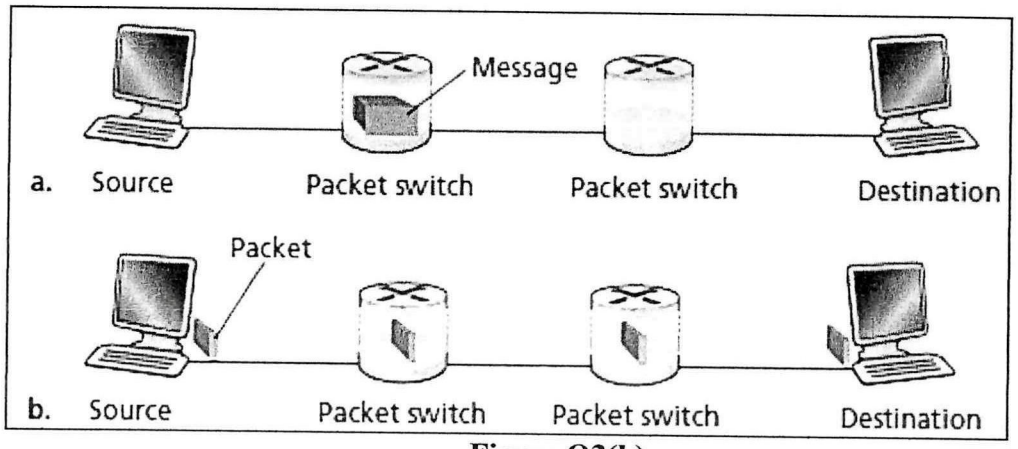

Figure Q3(b)

(i) Consider sending the message from source to destination without message segmentation. Discover how long does it take to move the message from the source host to the first packet switch? Keeping in mind that each switch uses store-and-forward packet switching, calculate the total time to move the message from source host to destination host.

(4 marks)

(ii) Now suppose that the message is segmented into 800 packets, with each packet being 10,000 bits long. Execute how long does it take to move the first packet from source host to the first switch? When the first packet is being sent from the first switch to the second switch, the second packet is being sent from the source host to the first switch. Discover at what time will the second packet be fully received at the first switch?

(4 marks)

Q4 Consider the seven-node network with nodes labeled *t* to *z* in **Figure Q4**.

(a) Propose the minimal-cost tree rooted at *z* that includes as end hosts nodes *u*, *v*, *w*, and *y*. Argue why your tree is a minimal-cost tree.

(10 marks)

(11

(b) By using appropriate table, use Dijkstra's shortest path algorithm to analyse the shortest path from *t* to all network nodes.

(10 marks)

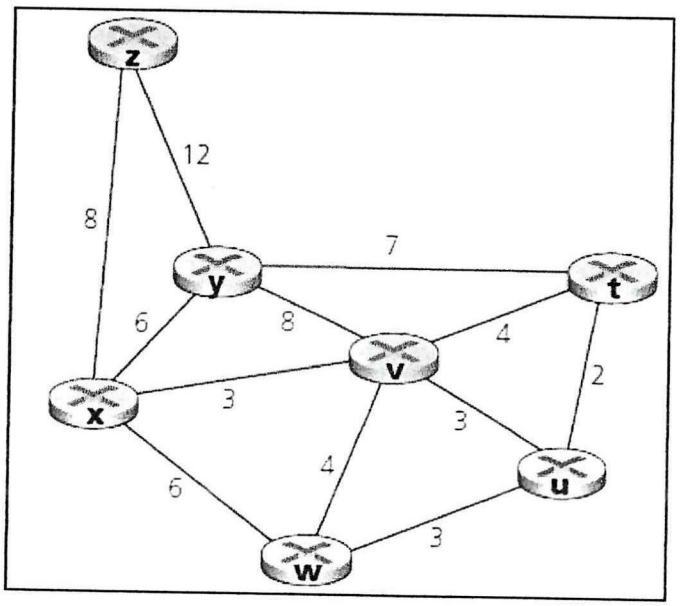

Figure Q4

Q5 (a) Analyse **Figure Q5(a)**. Now we replace the router between subnets *1* and *2* with a switch *S1*, and label the router between subnets *2* and *3* as *R1*.

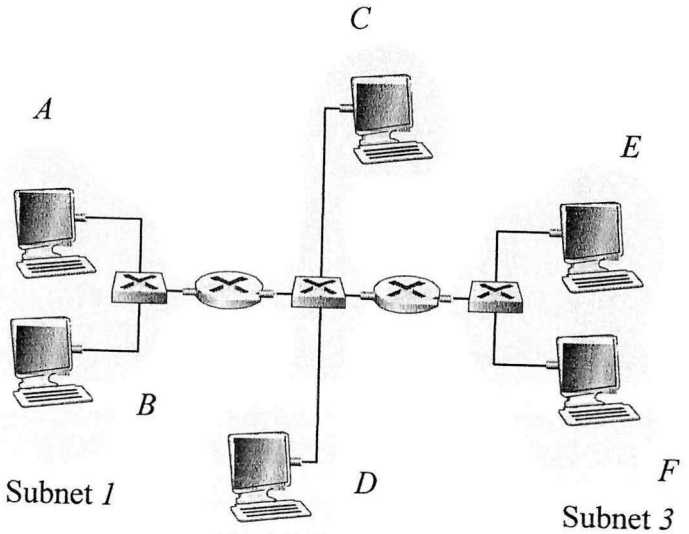

Figure Q5(a)

Consider sending an IP datagram from Host *E* to Host *F* in **Figure Q5(a)**.

(i) Do you think Host *E* will ask router *R1* to help forward the datagram?

(1 mark)

(ii) Discuss the reason for your answer in **Q5(a)(i)**.

(4 marks)

(iii) In the Ethernet frame containing the IP datagram, discover the source and destination IP and MAC addresses.

(6 marks)

(b) Suppose *E* would like to send an IP datagram to *B* in **Figure Q5(a)**, and assume that *E*'s ARP cache does not contain *B*'s MAC address.

(i) Will Host *E* ask router *R1* to help forward the datagram? Justify your answer.

(3 marks)

(ii) In the Ethernet frame that containing the IP datagram destined to *B* that is delivered to router *R1*, discover the source and destination IP and MAC addresses.

(6 marks)

- END OF QUESTIONS -