UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	COMPUTER NETWORKS
COURSE CODE	:	BEC41003
PROGRAMME	:	BEJ
EXAMINATION DATE	:	JULY 2020
DURATION	:	3 HOURS
INSTRUCTIONS	:	ANSWER **ALL FIVE** QUESTIONS. **OPEN BOOK EXAMINATION**

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 (a) Calculate the average effective bandwidth for 12-hours data transmission of 100 DVDs that hold 4.7 GB each.

(5 marks)

(b) An image is 1600X1200 pixels with 3 bytes/pixel. Assume the image is uncompressed. Calculate the time taken to transmit the image using:

(i) 56-kbps modem?

(ii) Over a 1-Mbps cable modem?

(iii) Over 100-Mbps Ethernet?

(7 marks)

(c) State eight methods to share a link for Cost-Effective Resource Sharing.

(8 marks)

Q2 (a) (i) State the difference between a permanent address and a care-of address?

(4 marks)

(ii) Propose who assigns a care-of address?

(3 marks)

(b) State three 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 your 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. Investigate whether this user is mobile from a network standpoint. Explain your answer.

(4 marks)

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

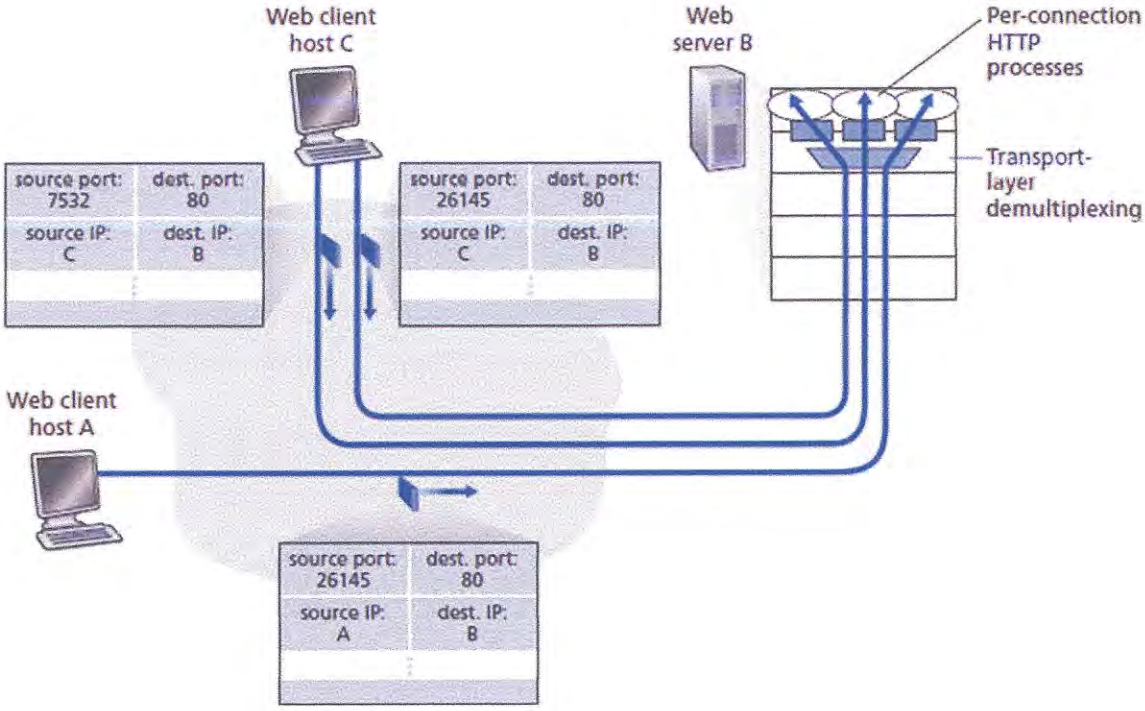

Figure Q3(a): Two clients communicate with the same Web Server application

(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 segments?

(6 marks)

(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 X 10^6 bits long that is to be sent from source to destination in **Figure Q3(b)**. Suppose each link in the figure is 2 Mbps. Ignore propagation, queuing, and processing delays.

(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, Find 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. Determine the time that the second packet be fully received at the first switch?

(4 marks)

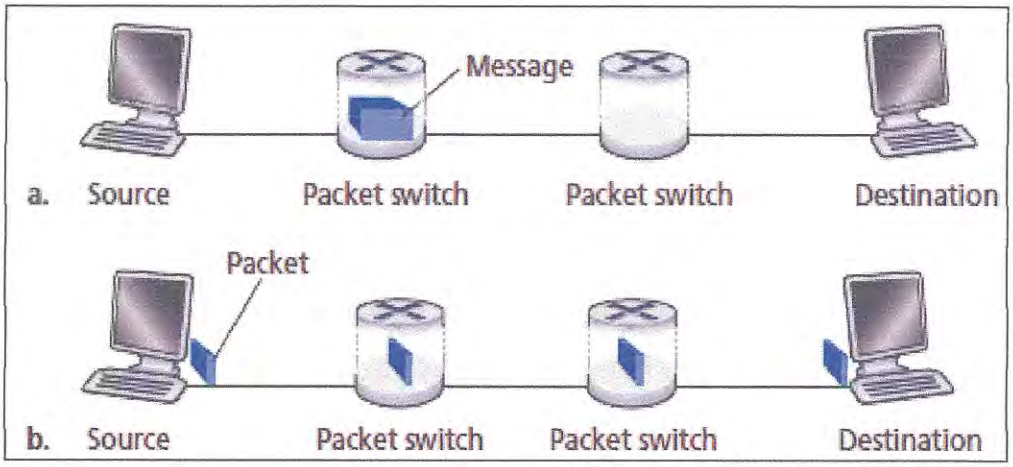

Figure Q3(b): End-to-end message transport: (a) without message segmentation; (b) with message segmentation

Q4 **Figure Q4** shows a network uses Dijkstra's shortest path algorithm. By using appropriate table:

i. Compute the shortest path from *t* to all network nodes.

(10 marks)

ii. Compute the shortest path from *u* to all network nodes.

(10 marks)

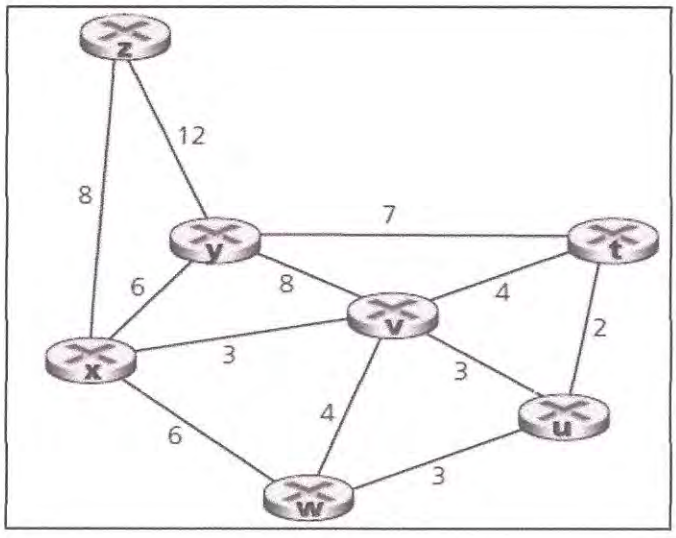

Figure Q4: Network use Dijkstra's shortest-path algorithm

Q5 (a) Analyse Figure Q5. Subnet 1 and 2 are connected with a switch S1, while Subnet 2 and 3 are connected using a router labelled as R1.

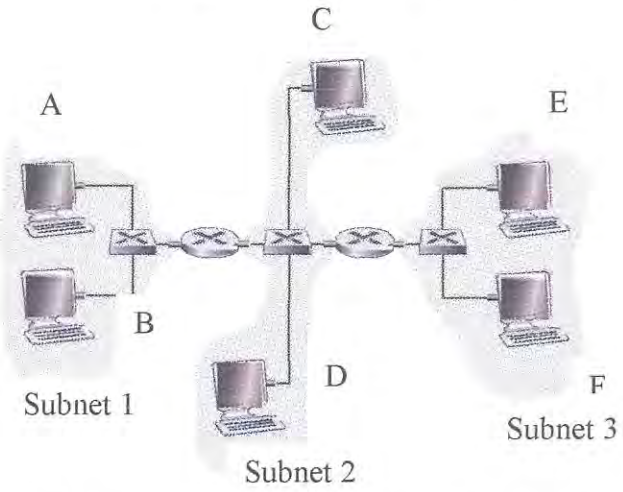

Figure Q5: Three subnets, interconnected by routers

Consider sending an IP datagram from Host E to Host F in Figure Q5.

(i) Determine whether Host E will ask router R1 to help forward the datagram or not.

(1 marks)

(ii) Give your justification for your answer in Q5(a)(i) ?

(4 marks)

(iii) In the Ethernet frame containing the IP datagram, provide 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, and assume that E's ARP cache does not contain B's MAC address.

(i) Determine whether Host E will ask router R1 to help forward the datagram or not. Explain you answer.

(3 marks)

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

(6 marks)

END OF QUESTIONS

- -