



UNIVERSITI TUN HUSSEIN ONN MALAYSIA
FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019

COURSE NAME : COMPUTER NETWORKS
COURSE CODE : BEC41003
PROGRAMME : BEJ
EXAMINATION DATE : JUNE 2019 /JULY 2019
DURATION : 3 HOURS
INSTRUCTIONS : ANSWER ALL QUESTIONS IN
THIS QUESTION BOOKLET

THIS QUESTION PAPER CONSISTS OF TEN (10) PAGES

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SECTION A (40 MARKS)

INSTRUCTION: Answer ALL questions. Any answer written in pencil will not be evaluated.

Q1 Instruction for Q1: Circle ONE answer ONLY. Any answer written in pencil will not be evaluated.

- i. Which of the following layer is not in OSI layer?
a) Physical layer
b) Internet layer
c) Network layer
d) Transport Layer
- (2 marks)

- ii. In virtual circuit network each packet contains
a) full source and destination address
b) a short VC number
c) both (a) and (b)
d) none of the mentioned
- (2 marks)

- iii. The 4 bytes IP address consists of
a) network address
b) host address
c) both (a) and (b)
d) none of the mentioned
- (2 marks)

- iv. ICMP is primarily used for
a) error and diagnostic functions
b) addressing
c) forwarding
d) none of the mentioned
- (2 marks)

- v. Website uses this Application layer protocol
a) SMTP
b) HTTP
c) FTP
d) SIP
- (2 marks)

- vi. Application layer protocol defines
a) types of messages exchanged
b) message format, syntax and semantics
c) rules for when and how processes send and respond to message
d) all of the mentioned
- (2 marks)

- vii. Which layer links the network support layers and user support layers
a) session layer
b) data link layer
c) transport layer
d) network layer
(2 marks)
- viii. Which address is used in an internet employing the TCP/IP protocols?
a) physical address and logical address
b) port address
c) specific address
d) all of the mentioned
(2 marks)
- ix. User datagram protocol is called connectionless because
a) all UDP packets are treated independently by transport layer
b) it sends data as a stream of related packets
c) both (a) and (b)
d) none of the mentioned
(2 marks)
- x. Which layer provides the services to user?
a) application layer
b) session layer
c) presentation layer
d) none of the mentioned
(2 marks)

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- Q2** (a) Suppose two hosts, A and B, are separated by 20,000 kilometres and are connected by a direct link of $R = 2$ Mbps. Suppose the propagation speed over the link is 2.5×10^8 meters/sec.
- i. Calculate the bandwidth-delay product, $R \cdot d_{\text{prop}}$.
(3 marks)
 - ii. Consider sending a file of 800,000 bits from Host A to Host B. Suppose the file is sent continuously as one large message. Produce the maximum number of bits that will be in the link at any given time?
(3 marks)
 - iii. Calculate total delay does it take to send the file, assuming it is sent continuously.
(4 marks)
 - iv. Derive a general expression for the width of a bit in terms of the propagation speed s , the transmission rate R , and the length of the link m .
(2 marks)
 - v. Suppose the value of R can be modify. Calculate new value of R to produce the width of a bit as long as the length of link.
(5 marks)
 - vi. Now, consider the value for $R = 1$ Gbps, calculate the new value for bandwidth-delay product, $R \cdot d_{\text{prop}}$.
(3 marks)

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- Q3** (a) i. What is the difference between a *permanent address* and a *care-of address*? (4 marks)
- ii. Who assigns a *care-of address*? (3 marks)
- (b) What are 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. Is this user mobile from a network standpoint? (4 marks)

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Q4 (a) Figure Q4(a) shows two clients communicate with the same Web Server application.

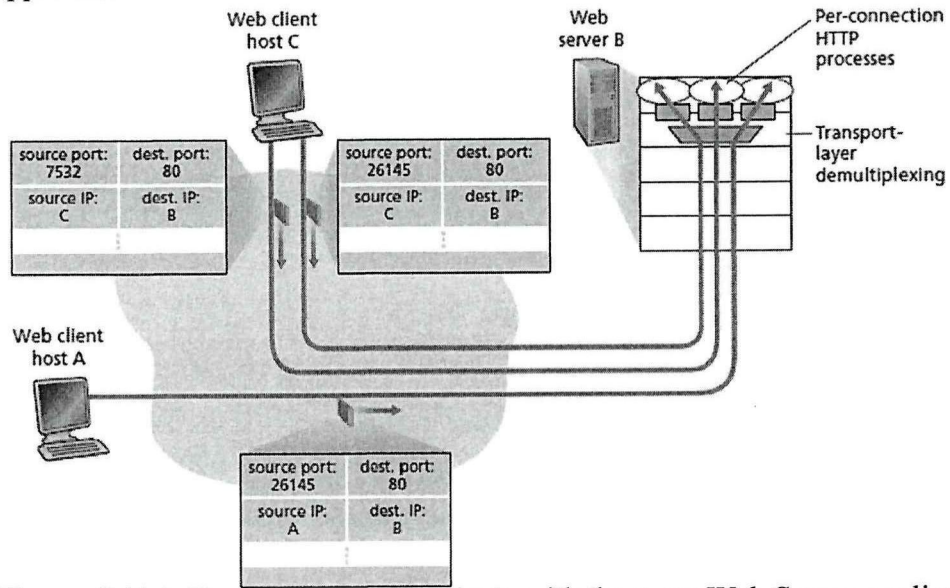


Figure Q4(a): Two clients communicate with the same Web Server application.

- i. Determine the source and destination port values in the segments flowing from the server back to the clients' processes. (9 marks)
- ii. Determine the source and destination IP addresses in the network-layer datagrams carrying the transport-layer segments? (6 marks)

Note: You can use the same figure to answer Q4(a)i and Q4(a)ii.

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- (b) Describe why an application developer might choose to run an application over UDP rather than TCP.

(5 marks)

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Q5 Figure Q5 shows the network use Dijkstra's shortest path algorithm. By using appropriate table shows your work to do the following tasks;

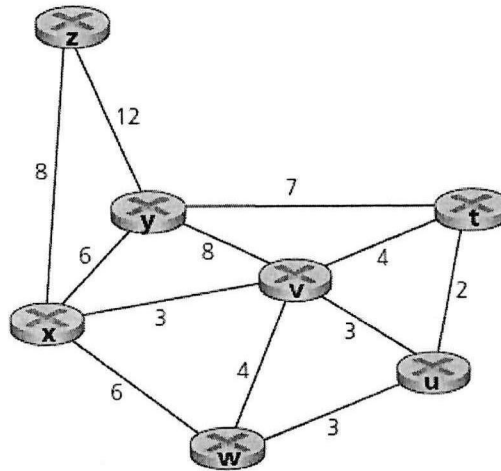


Figure Q5: Network use Dijkstra's shortest-path algorithm

- (a) Compute the shortest path from *t* to all network nodes. (10 marks)
- (b) Compute the shortest path from *u* to all network nodes. (10 marks)

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Q6

Analyse **Figure Q6**. Now we replace the router between subnets 1 and 2 with a switch *SI*, and label the router between subnets 2 and 3 as *R1*.

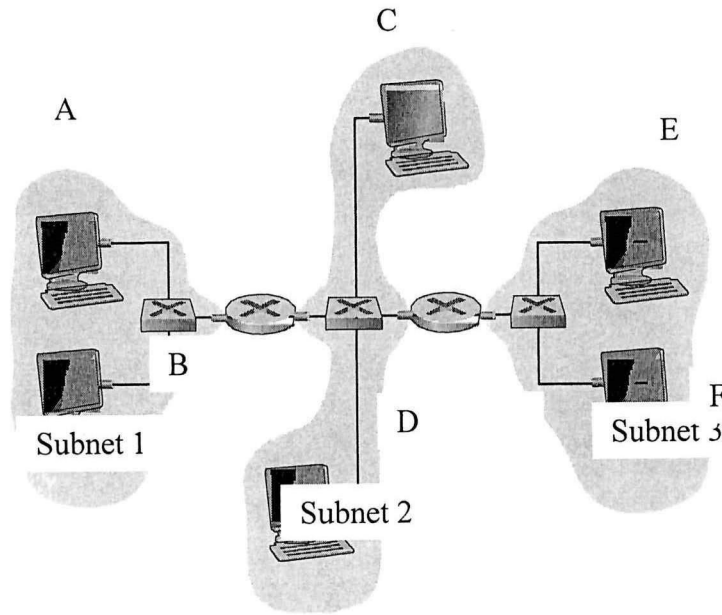


Figure Q6 : Three subnets, interconnected by routers

- (a) Consider sending an IP datagram from Host E to Host F in **Figure Q6**.
 - i. Will Host E ask router *R1* to help forward the datagram? (1 marks)
 - ii. Give the reason for your answer in **Q6(a)i** ? (4 marks)
 - iii. In the Ethernet frame containing the IP datagram, what are the source and destination IP and MAC addresses? (6 marks)

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(b) Suppose E would like to send an IP datagram to B in **Figure Q6**, 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? Explain your answer.

(3 marks)

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

(6 marks)

- END OF QUESTIONS -

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