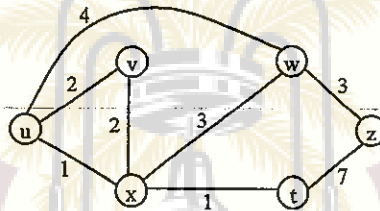


第一大題：填充題 (40%)

說明：本大題共包含十小題，每小題四分。作答時請清楚標示題號，並於試卷上「非選擇題作答區」填寫正確答案 (不必附計算過程)。答案空白者不計分，答錯不倒扣。

1. The TCP round-trip time (RTT) is currently 30 msec and after an acknowledgement comes in after 26 ms, the RTT is updated to 29.6 msec. The new RTT estimate after another acknowledgement comes in again after 32 msec is _____.
2. For a TCP connection, let MSS be the maximum segment size, RTT be the round-trip time, and L be the segment loss rate. The average throughput of the TCP connection in terms of MSS, RTT, and L is _____.
3. Consider a transport layer protocol that uses an 8-bit sequence number. If the maximum packet (TPDU) size is 128 bytes and the maximum TPDU lifetime is 30 sec, the maximum throughput that such a transport protocol can achieve is _____.
4. The highest IPv6 address in the CIDR address block 2014:DB8::/48 is _____.
5. Consider a network of 6 nodes with link costs as shown in the following figure. By using the distance-vector routing algorithm, the routing table at node v is _____.



6. A large population of ALOHA users generate 50 requests/sec, including both originals and retransmissions. Assuming that time is slotted in units of 40 msec, the expected number of transmission attempts needed before success is _____.
7. Consider building a CSMA/CD network running at 1 Gbps over a 1 km cable with no repeaters. Assuming that the signal speed in the cable is 200,000 km/sec, the minimum frame size is _____.
8. Consider CRC based on polynomial codes. The remainder obtained by dividing x^7+x^5+1 by the generator polynomial x^3+1 is _____.
9. Consider a channel with a bit rate of 4 kbps and a propagation delay of 20 msec. The range of frame sizes that a stop-and-wait protocol can give an efficiency of at least 50% is _____.
10. Consider the queuing delay in a router buffer. Suppose all packets are L bits, the transmission rate is R bps, and that N packets simultaneously arrive at the buffer every LN/R seconds. The average queuing delay of a packet is _____.

見背面

第二大題：簡答題 (60%)

說明：本大題共包含十小題，每小題六分。作答時請清楚標示題號，並於試卷上「非選擇題作答區」簡單扼要回答問題。答案空白者不計分，答錯不倒扣。

11. Explain the following terminology for link, network, and transport layers respectively: (a) switch poisoning, (b) hot-potato routing, and (c) SYN cookies.
12. Describe two approaches to facilitate co-existence (or transition) between IPv4 and IPv6 addressing.
13. Routing protocols typically need to exchange a large amount of control packets (overheads) for building routing tables. Explain how link-state (LS) routing works in terms of information exchange among nodes. Propose an approach to reduce such overheads when LS routing is used atop wireless links with limited bandwidth.
14. Describe the definition of “spanning tree” in graph theory and explain the benefits of using minimum spanning tree algorithms in unicast routing and broadcast routing respectively.
15. Describe two problems of using CSMA/CD in wireless links and how CSMA/CA (used in 802.11) addresses these problems.
16. Explain the main difference between TCP Tahoe and TCP Reno in terms of congestion control and the philosophy behind such a change.
17. Explain RED (random early detection) queue management and how it helps TCP for congestion control compared to drop-tail queue management.
18. Collisions could occur during contention of CSMA protocols. Explain how 1-persistent, non-persistent, and p-persistent CSMA protocols behave differently to avoid repeated collisions.
19. Explain the difference between persistent and non-persistent HTTP connections. Why are persistent connections preferred?
20. Explain the following terms for Internet malware: (a) worm, (b) virus, and (c) Trojan horse.

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