CSC 435/524 Computer Networks
Question Bank on Module 5 - Routing Protocols
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1) Explain the following terms in the context of routing in the Internet:
   a. Source Independence
   b. Next hop forwarding
   c. Store and Forward technique

2) Default routing helps simplify routing tables. For example, suppose a wide-area network (WAN) consists of two routers. Each router can have a routing table entry for each local address (i.e., the address of each computer to the router) plus a default route that points to the other router. Under what circumstances does the scheme fail?

3) Why we need to use the store and forward technique in WAN? Is it not possible for a router to immediately put a packet received in its input port to an output port?

4) Complete the forwarding table at routers R1, R2, R3 and R4 shown below. Minimize the number of entries in the routing tables as much as possible using default entries.
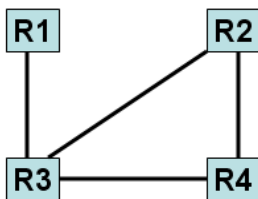

5) Consider an internetwork of routers R1, R2, R3, R4 and R5 as shown in the figures. Use the Distance Vector routing algorithm to compute the routing tables at each of the five routers in the internetwork. What is the diameter of the internetwork? Justify your answer.
   - Assume the weight of each edge is 1.
   - Assume time is slotted and each router sends its local routing table to all its neighboring routers at the beginning of each time slot.
   - Break ties between routers in favor of the router with the lowest id
   - You should show your work at each time slot, until there is no change in the routing table at each router.
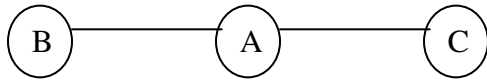
   (a)
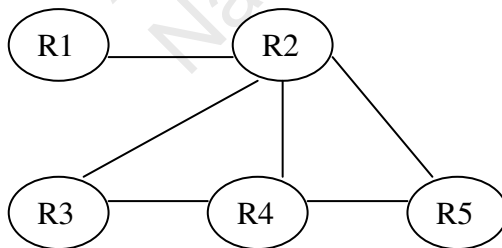
   (b)
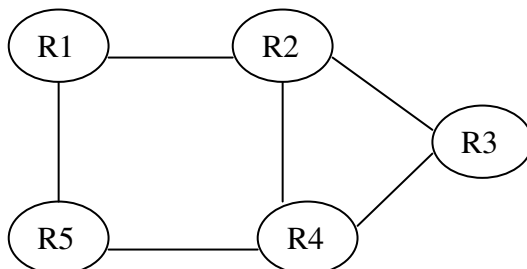
6) Consider the following simple network (chain) and the routing tables at the three routers. Explain how the failure of link B - A could trigger a count-to-infinity problem.

Routing table at A

Dest.	Cost	Next Hop
A	0	-
B	1	B
C	1	C

Routing table at B

Dest.	Cost	Next Hop
A	1	A
B	0	-
C	2	A

Routing table at C

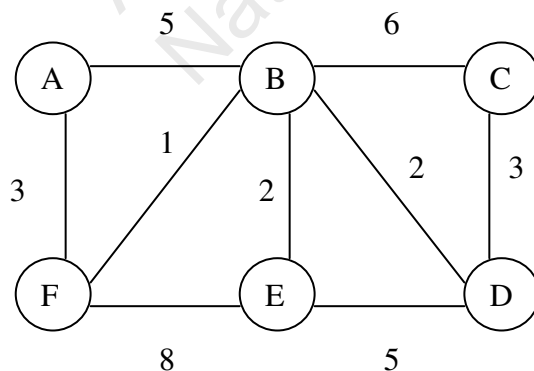| Dest.	Cost	Next Hop
A	1	A
B	2	A
C	0	-

7) Briefly explain the three solutions for the count-to-infinity problem.

8) Run the Dijkstra algorithm for the **largest bottleneck path problem** on the following weighted network graphs assuming node A as the source node (starting node)

(a)
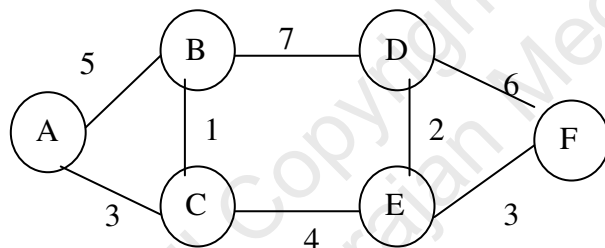
(b)

9) What is the fundamental difference between the Distance Vector Routing Protocol and the Link State Routing Protocol? Briefly explain.

10) What is an autonomous system?

11) What are the two types of routing protocols for the Internet? What is the main difference between these two categories of protocols in terms of the routing principles? Give an example for each.

12) Why IP multicast is said to be anonymous? Give two reasons.

13) Briefly explain the working of the Internet Group Membership Protocol (IGMP).

14) What are the three approaches for multicast datagram forwarding? When do you use each approach?

15) Briefly explain the following terms: (a) Reverse Path Broadcast and (b) Reverse Path Multicast

16) Briefly explain the working of the following multicast protocols:
a. Flood and Prune
b. PIM-SM (Protocol-Independent Multicast) protocol
c. MOSPF

17) Assume a full 4-ary rooted multicast tree of height 7, where each intermediate node has exactly 4-children and the root node is at height 0. If all the leaf nodes of this tree are part of the multicast group and the root node is the sender, compute the number of link transmissions involved in multicasting vs. multiple unicasting.

18) What are the pros and cons of PIM-SM? How is it different from OSPF?