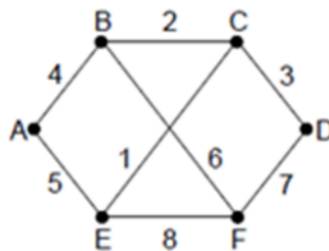


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CISC7002 Computer Communications and Networks  
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### Homework #3

**Problem 1.** (Chapter 5-5) Consider the network in the following figure. Distance vector routing is used, and the following vectors have just come in to router C: from B (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). The cost of the links from C to B, D, and E, and 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the cost.



**Solution:**

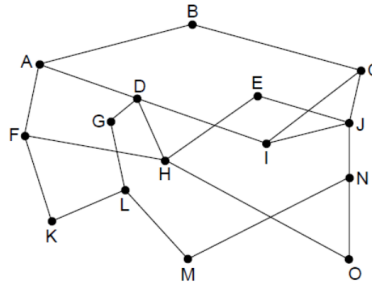
The distance table router C received from it's neighbor router.

router C	B+6	D+3	E+5	Shortest
A	5	16	7	11(B)
B	0	12	6	6(B)
C	8	6	3	0
D	12	0	9	3(D)
E	6	9	0	5(E)
F	2	10	4	8(B)

So the routing table in C is:

router C	Distance	Next Routing
A	11	B
B	6	B
D	3	D
E	5	E
F	8	B

**Problem 2.** (Chapter 5-9) Looking at the network in the following figure, how many packets are generated by a broadcast from B, using: (a) reverse path forwarding? (b) the sink tree?



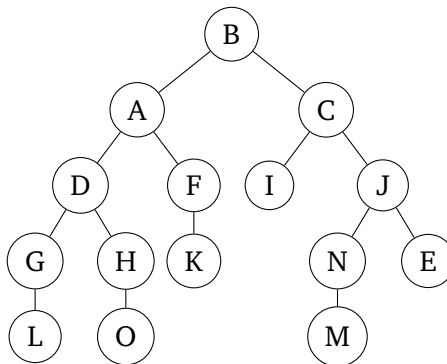
**Solution:**

(a) reverse path forwarding?

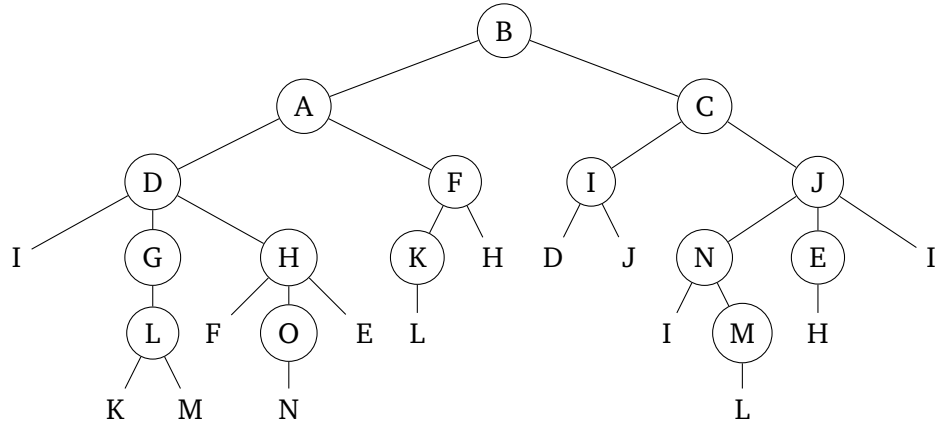
Computing sink tree

	A	C	D	E	F	G	H	I	J	K	L	M	N	O
0	<b>1,B</b>	1,B	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-
1		<b>1,B</b>	2,A	inf,-	2,A	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-	inf,-
2			<b>2,A</b>	inf,-	2,A	inf,-	inf,-	2,C	2,C	inf,-	inf,-	inf,-	inf,-	inf,-
3				inf,-	<b>2,A</b>	3,D	3,D	2,C	2,C	inf,-	inf,-	inf,-	inf,-	inf,-
4				inf,-		3,D	3,D	<b>2,C</b>	2,C	3,F	inf,-	inf,-	inf,-	inf,-
5				inf,-		3,D	3,D		<b>2,C</b>	3,F	inf,-	inf,-	inf,-	inf,-
6				<b>3,J</b>		3,D	3,D			3,F	inf,-	inf,-	3,J	inf,-
7						<b>3,D</b>	3,D			3,F	inf,-	inf,-	3,J	inf,-
8							<b>3,D</b>			3,F	4,G	inf,-	3,J	inf,-
9										<b>3,F</b>	4,G	inf,-	3,J	4,H
10											4,G	inf,-	<b>3,J</b>	4,H
11											<b>4,G</b>	4,N		4,H
12												<b>4,N</b>		4,H
13														<b>4,H</b>

Sink tree



The tree built by reverse path forwarding



Therefore the reverse path forwarding needs **five** rounds to broadcast a packet from B to other nodes.

- (1) round 1:  
B sends 2 packets to A and C.  
Total packets is **2**.
- (2) round 2:  
A sends 2 packets to D and F.  
C sends 2 packets to I and J.  
Total packets is **6**.
- (3) round 3:  
D sends 3 packets to I, G and H.  
F sends 2 packets to K and H.  
I sends 2 packets to D and J.  
J sends 3 packets to N, E and I.  
Total packets is **16**.
- (4) round 4:  
G sends 1 packet to L.  
H sends 3 packets to F, O and E.  
K sends 1 packet to L.  
N sends 2 packets to I and M.  
E sends 1 packet to H.  
Total packets is **24**.
- (5) round 5:  
L sends 2 packets to K and M.  
O sends 1 packet to N.  
M sends 1 packet to L.  
Total packets is **28**.

Number of generated packets:  $2 + 4 + 10 + 8 + 4 = 28$

- (b) the sink tree?  
the sink tree needs **four** rounds to broadcast a packet from B to other nodes.

(1) round 1:  
B sends 2 packets to A and C.  
Total packets is **2**.

(2) round 2:  
A sends 2 packets to D and F.  
C sends 2 packets to I and J.  
Total packets is **6**.

(3) round 3:  
D sends 2 packets to G and H.  
F sends 1 packet to K.  
J sends 2 packets to N and E.  
Total packets is **11**.

(4) round 4:  
G sends 1 packet to L.  
H sends 1 packet to O.  
N sends 1 packet to M.  
Total packets is **14**.

Number of generated packets:  $2 + 4 + 5 + 3 = 14$