RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

DCS-503 Computer Networks

Lecture-19

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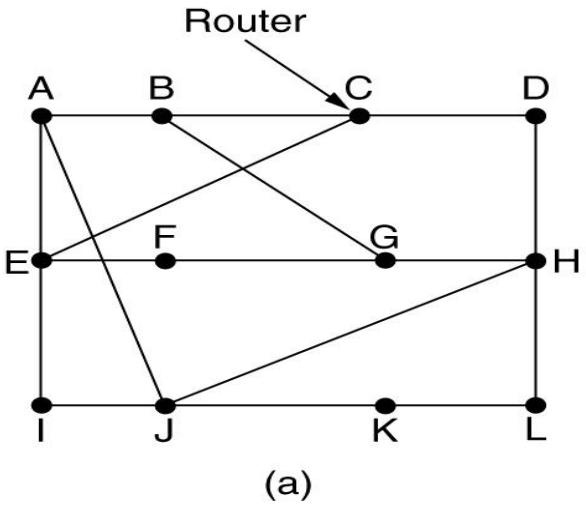
Computer Science & Engineering

OUTLINE

- THE NETWORK LAYER PROBLEM PACKET SWITCHING
- THE NETWORK LAYER PROBLEM : CONNECTIONLESS SERVICE
- THE PROBLEM NETWORK LAYER : CONNECTION-ORIENTED SERVICE
- CONNECTIONLESS VS. CONNECTION-ORIENTED
- SHORTEST PATH ALGORITHM

RAMA UNIVERSITY UTTAR PRADESH KANPUR

DISTANCE VECTOR ROUTING



(a)

(a) A subnet.

To	A	I	H	K	New estimated delay from J	Line
A	0	24	20	21	8	A
B	12	36	31	28	20	A
C	25	18	19	36	28	I
D	40	27	8	24	20	H
E	14	7	30	22	17	I
F	23	20	19	40	30	I
G	18	31	6	31	18	H
H	17	20	0	19	12	H
I	21	0	14	22	10	I
J	9	11	7	10	0	–
K	24	22	22	0	6	K
L	29	33	9	9	15	K

JA delay is 8 | JI delay is 10 | JH delay is 12 | JK delay is 6

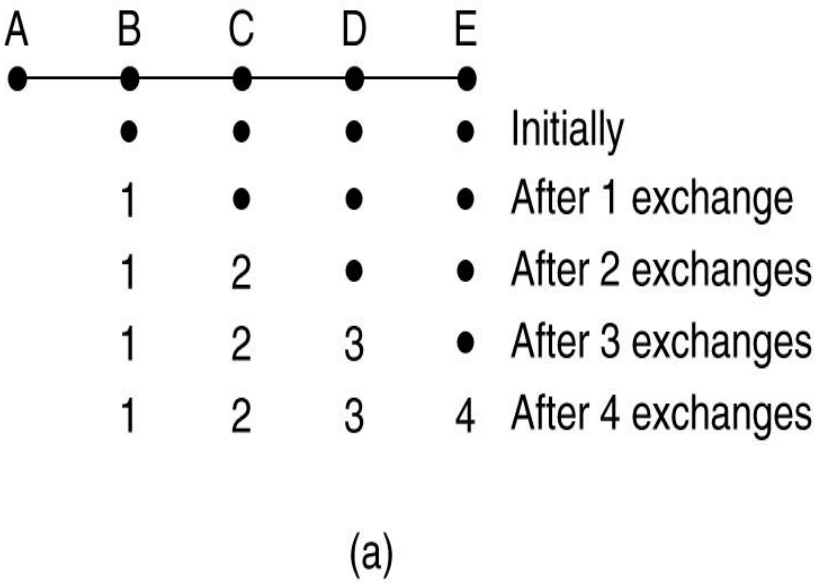
Vectors received from J's four neighbors

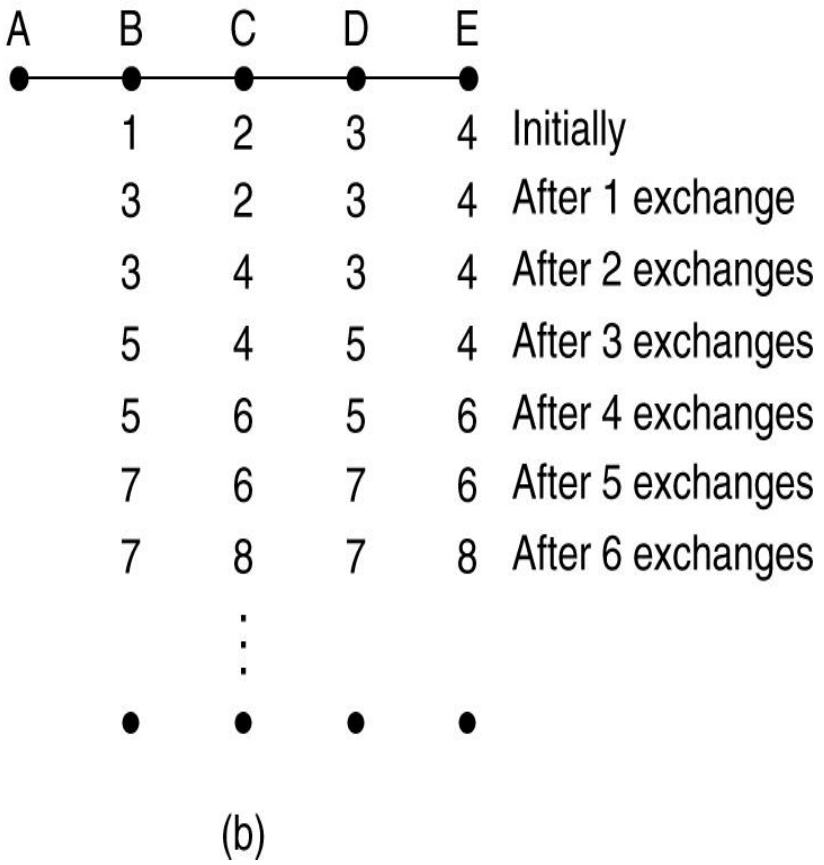
New routing table for J

(b)

(b) Input from A, I, H, K, and the new routing table for J.

THE COUNT-TO-INFINITY PROBLEM

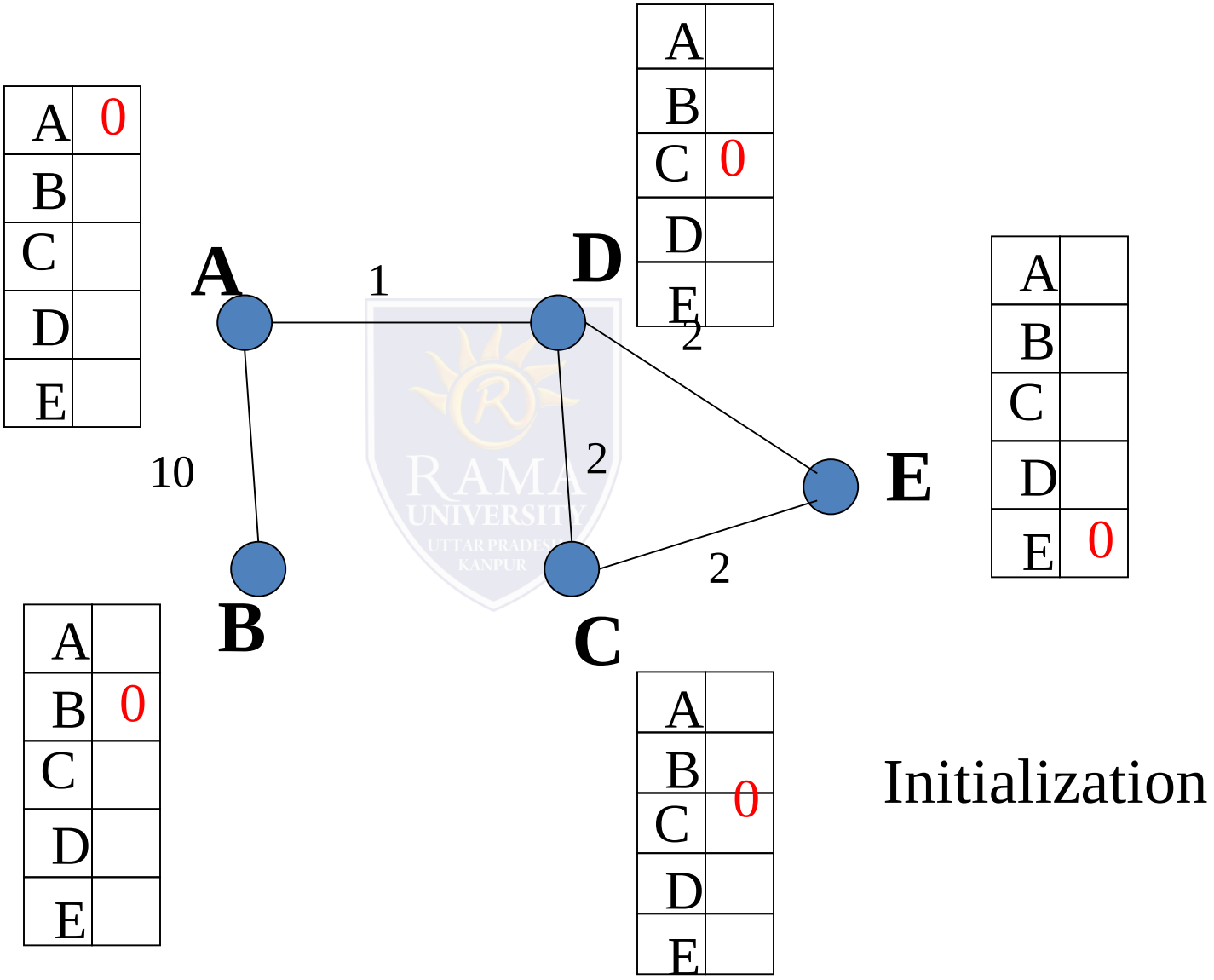


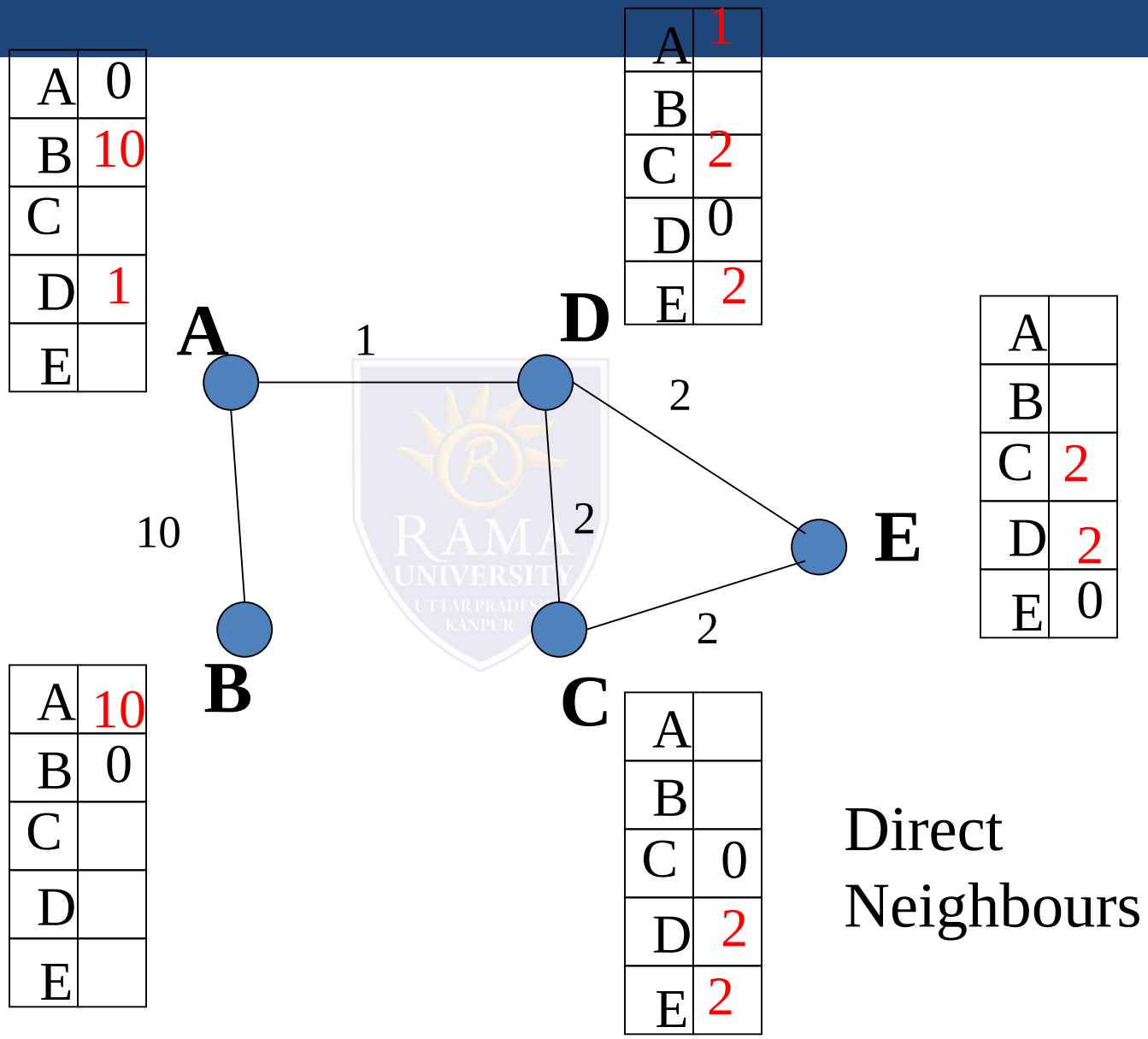


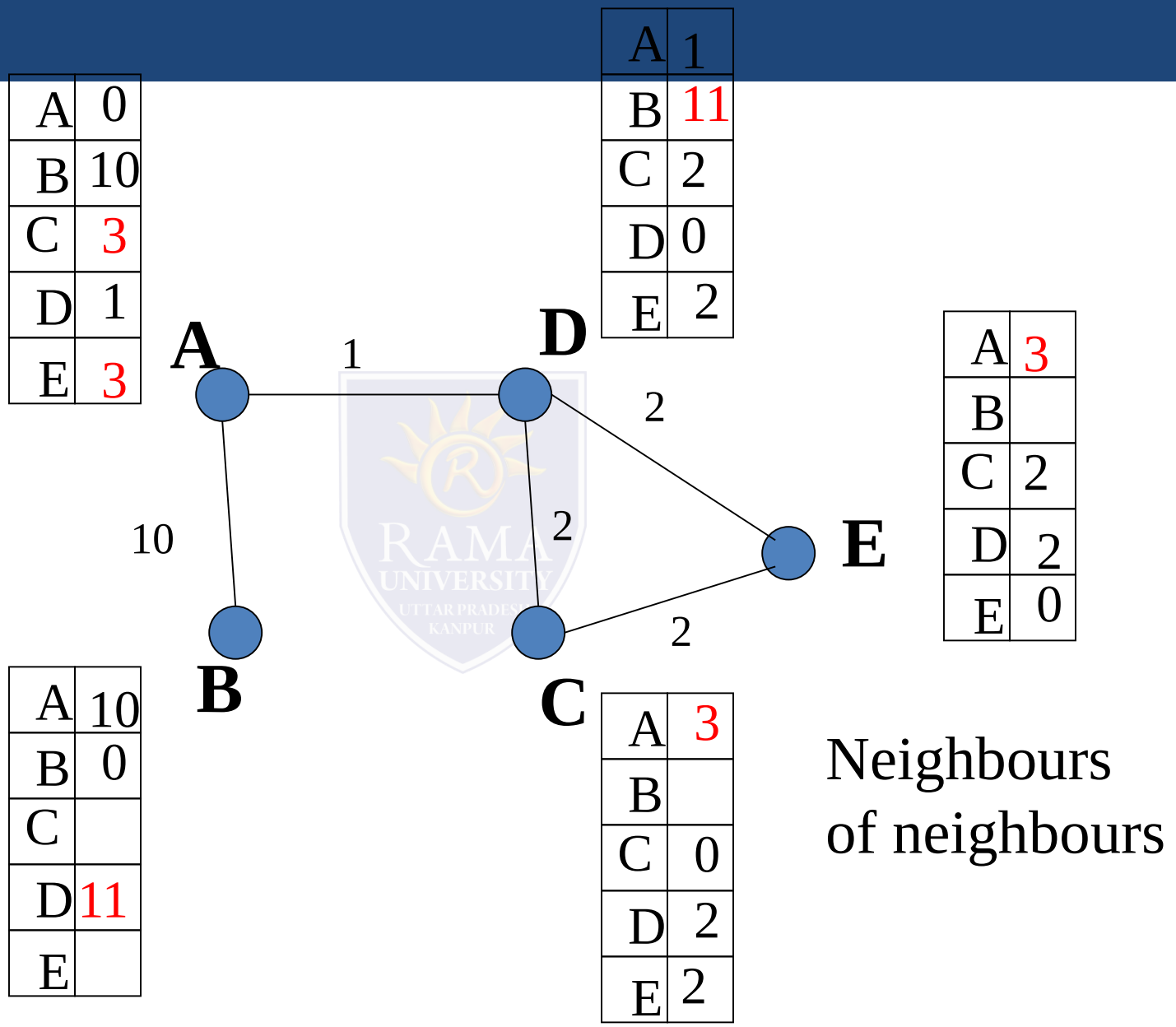
3 Distance Vector Routing (3): Loop-Breaking Heuristics

- Set infinity to a limited number, e.g. 16.
- Split horizon
- Split horizon with poison reverse

Example

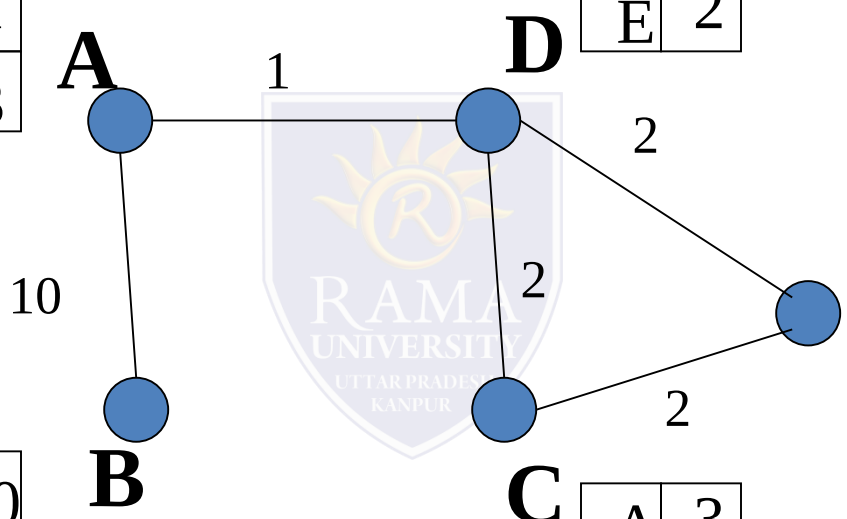



A
B
C
D
E
1
10
2
2
2
A 0
B 10
C
D 1
E
A 1
B
C 2
D 0
E 2
A
B
C 2
D 2
E 0
A 10
B 0
C
D
E
A
B
C 0
D 2
E 2
Direct
Neighbours


A
B
C
D
E
1
10
2
2
2
A 0
B 10
C 3
D 1
E 3
A 1
B 11
C 2
D 0
E 2
A 3
B
C 2
D 2
E 0
A 10
B 0
C
D 11
E
A 3
B
C 0
D 2
E 2
Neighbours
of neighbours

A	0
B	10
C	3
D	1
E	3

A	1
B	11
C	2
D	0
E	2



A	3
B	13
C	2
D	2
E	0

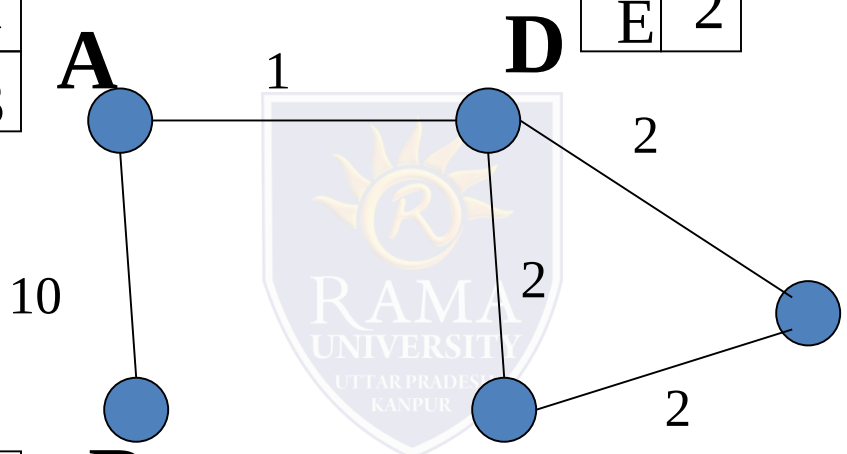
A	10
B	0
C	13
D	11
E	13

A	3
B	13
C	0
D	2
E	2

Neighbours of neighbours of neighbours

A	0
B	10
C	3
D	1
E	3

A	1
B	11
C	2
D	0
E	2

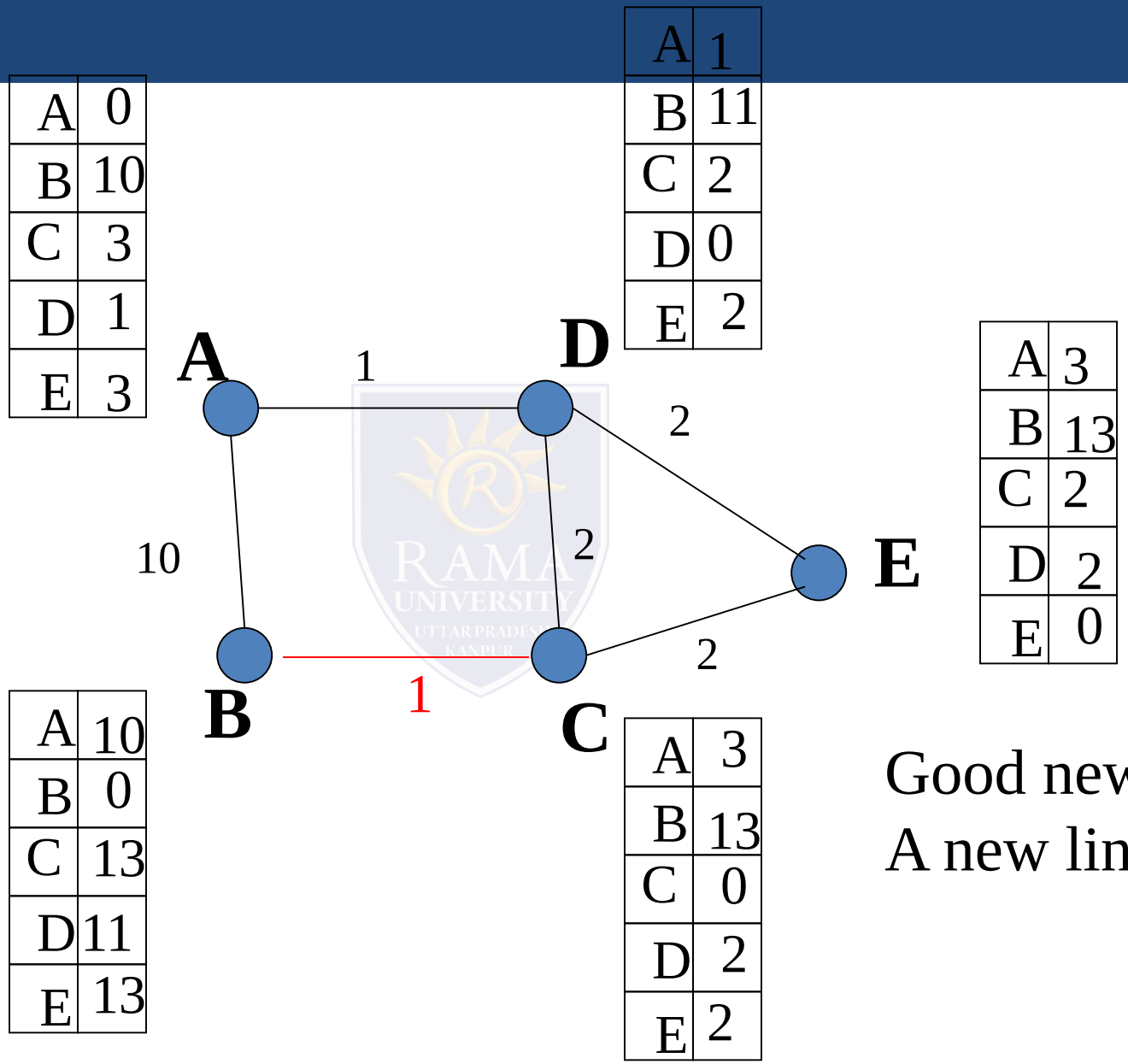


A	3
B	13
C	2
D	2
E	0

A	10
B	0
C	13
D	11
E	13

A	3
B	13
C	0
D	2
E	2

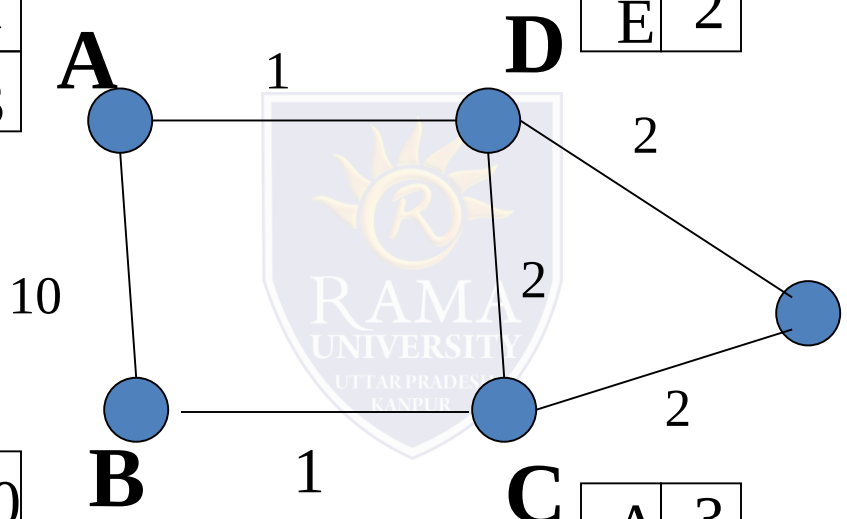
Stable convergence



Good news:
A new link!

A	0
B	10
C	3
D	1
E	3

A	1
B	11
C	2
D	0
E	2

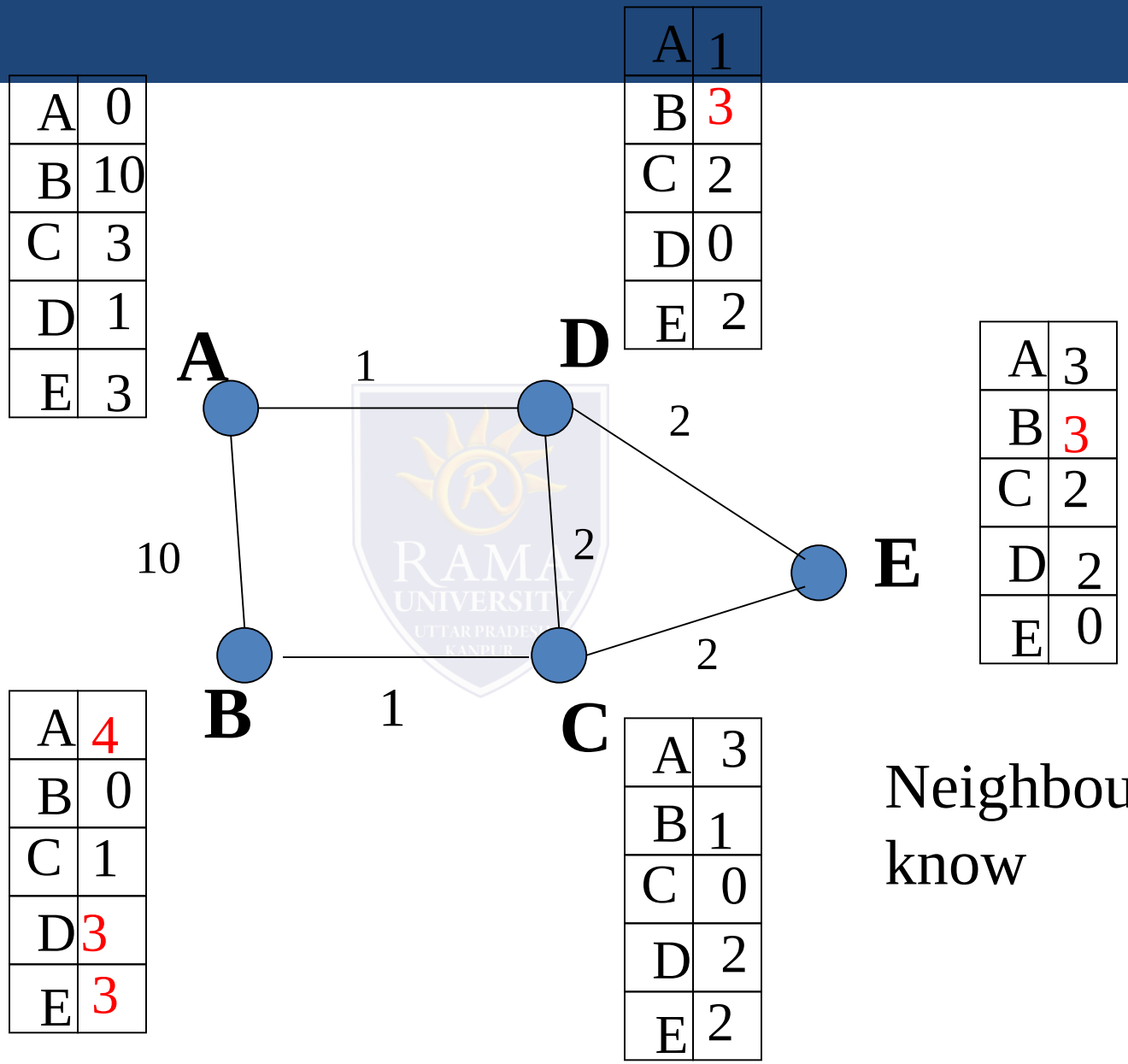


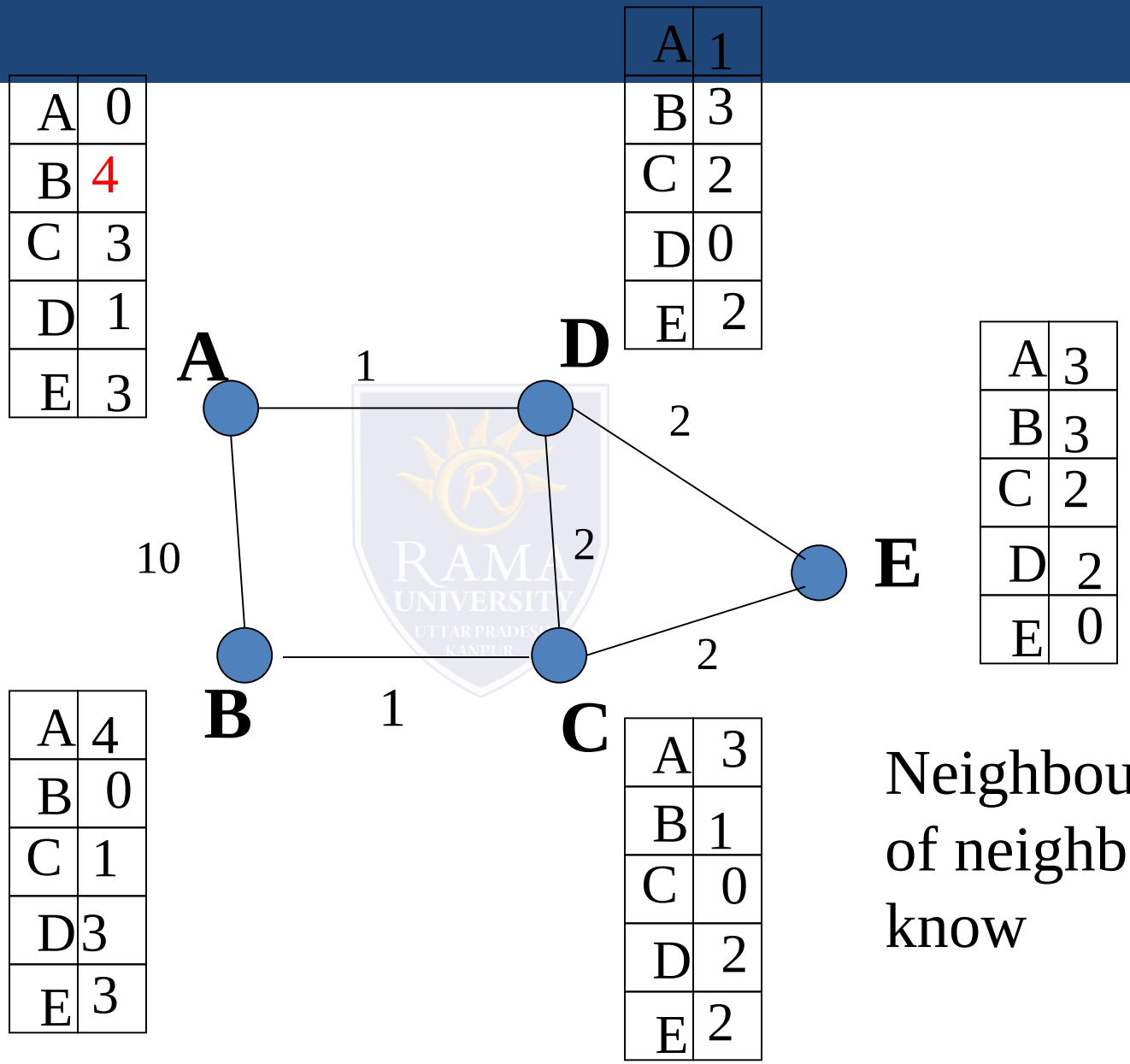
A	3
B	13
C	2
D	2
E	0

A	10
B	0
C	1
D	11
E	13

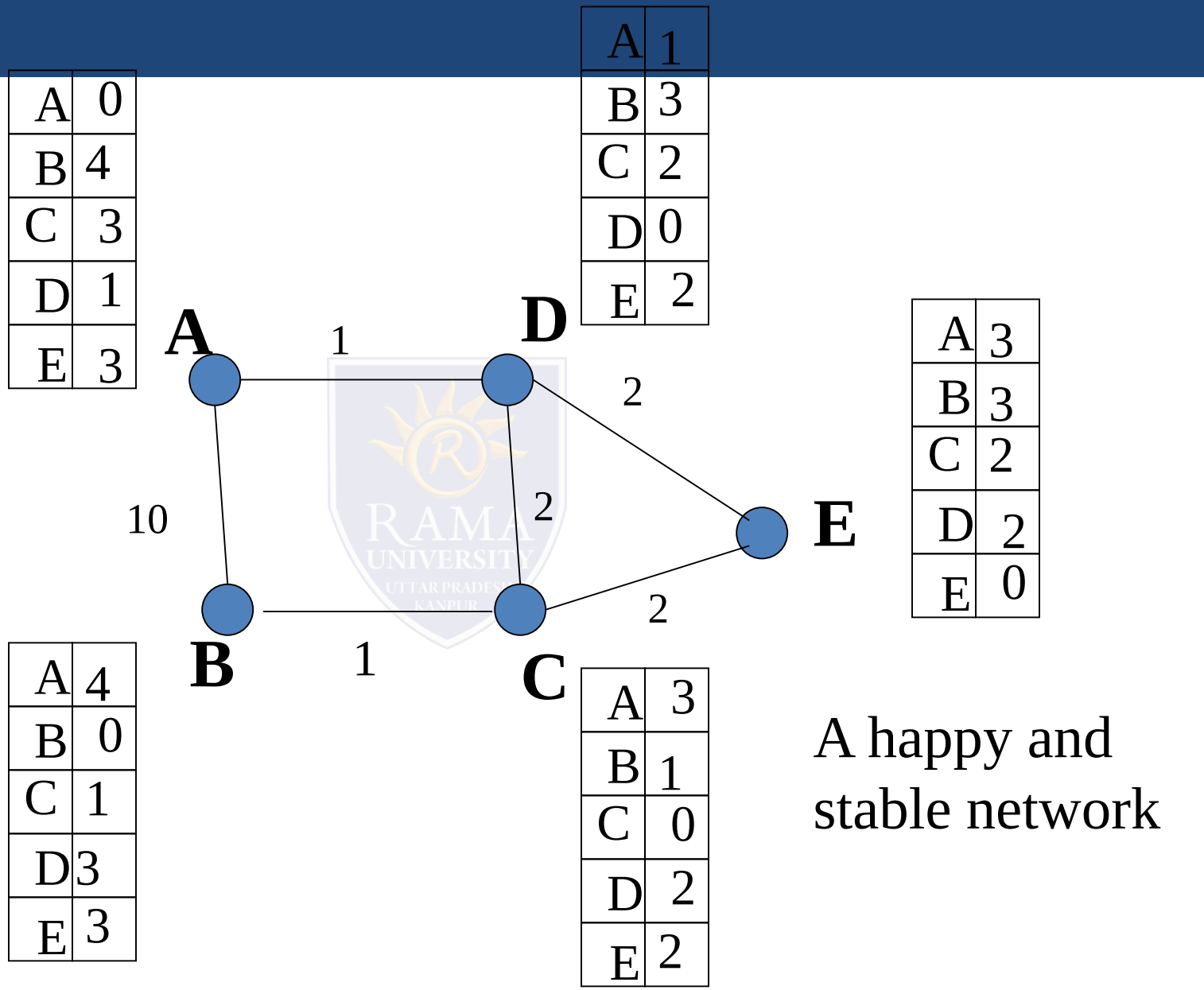
A	3
B	1
C	0
D	2
E	2

Direct endpoints know

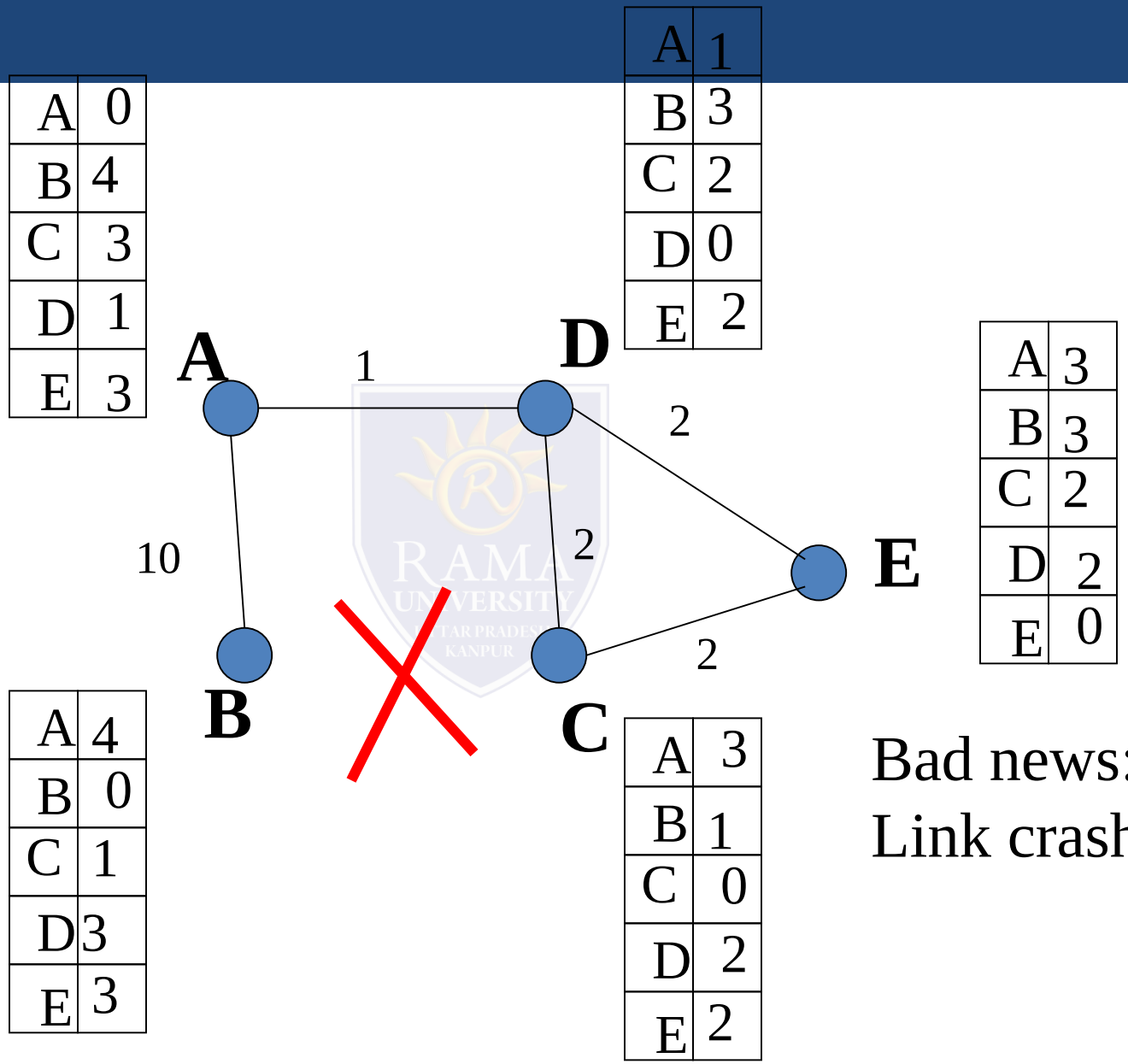

A
D
B
C
E
1
2
10
2
1
2
A 0
B 10
C 3
D 1
E 3
A 1
B 3
C 2
D 0
E 2
A 3
B 3
C 2
D 2
E 0
A 4
B 0
C 1
D 3
E 3
A 3
B 1
C 0
D 2
E 2
Neighbours know



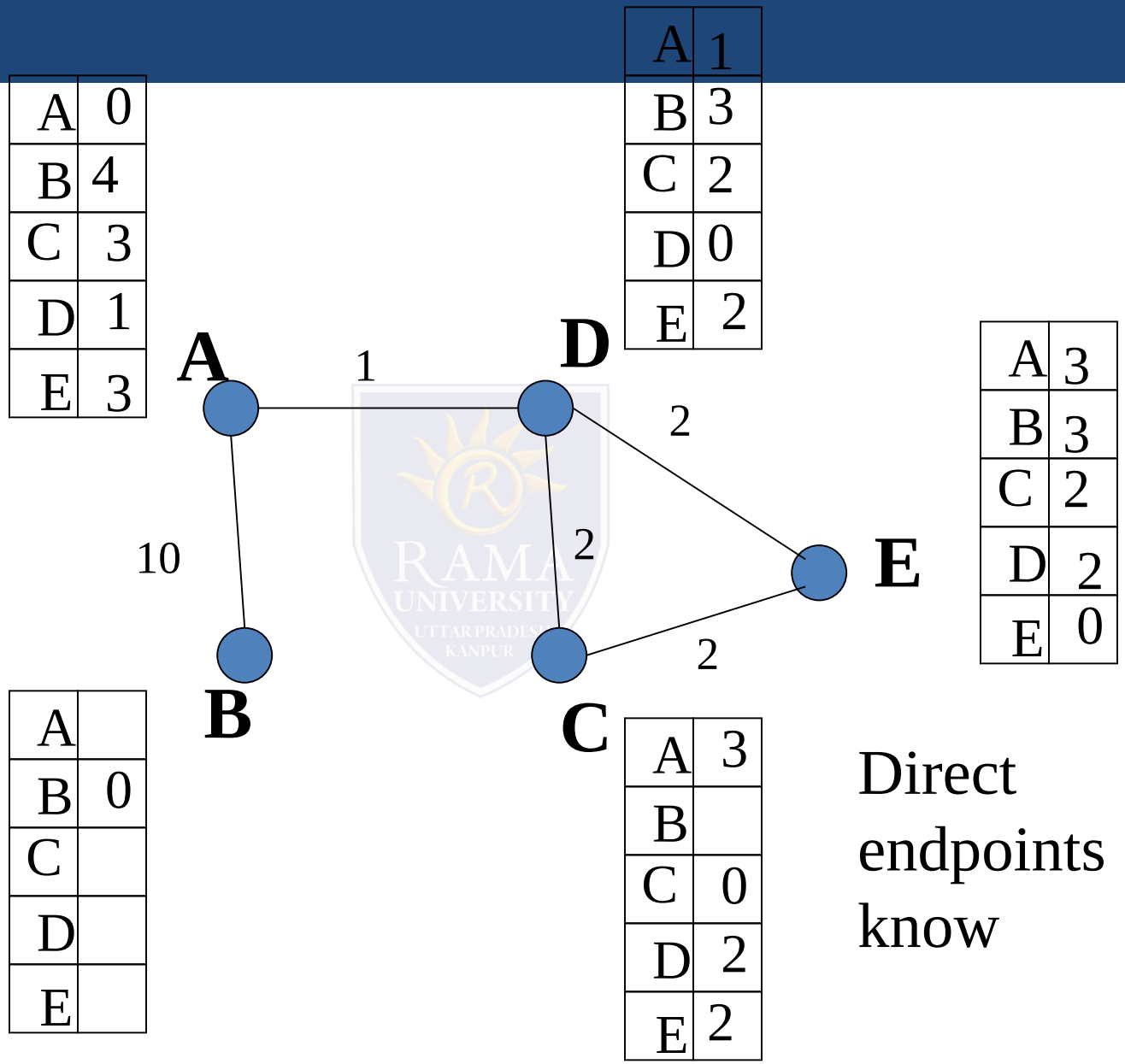
Neighbours of neighbours know



A happy and stable network

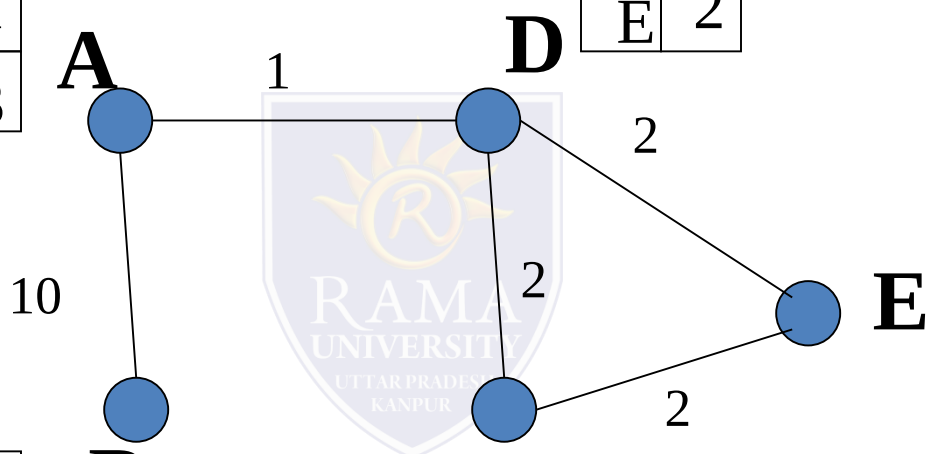


Bad news:
Link crash!!


A
B
C
D
E
1
10
2
2
2
A 0
B 4
C 3
D 1
E 3
A 1
B 3
C 2
D 0
E 2
A 3
B 3
C 2
D 2
E 0
A
B 0
C
D
E
A 3
B
C 0
D 2
E 2
Direct endpoints know

A	0
B	4
C	3
D	1
E	3

A	1
B	3
C	2
D	0
E	2



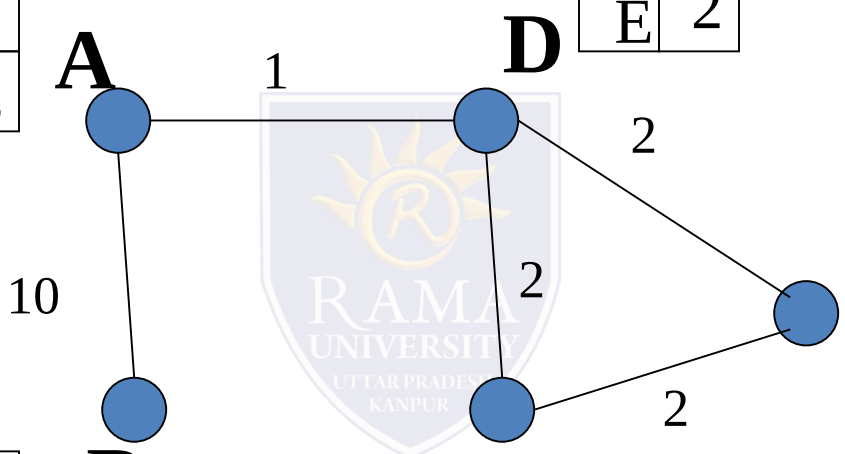
A	3
B	3
C	2
D	2
E	0

A	10
B	0
C	
D	
E	

A	3
B	
C	0
D	2
E	2

A	0
B	4
C	3
D	1
E	3

A	1
B	3
C	2
D	0
E	2

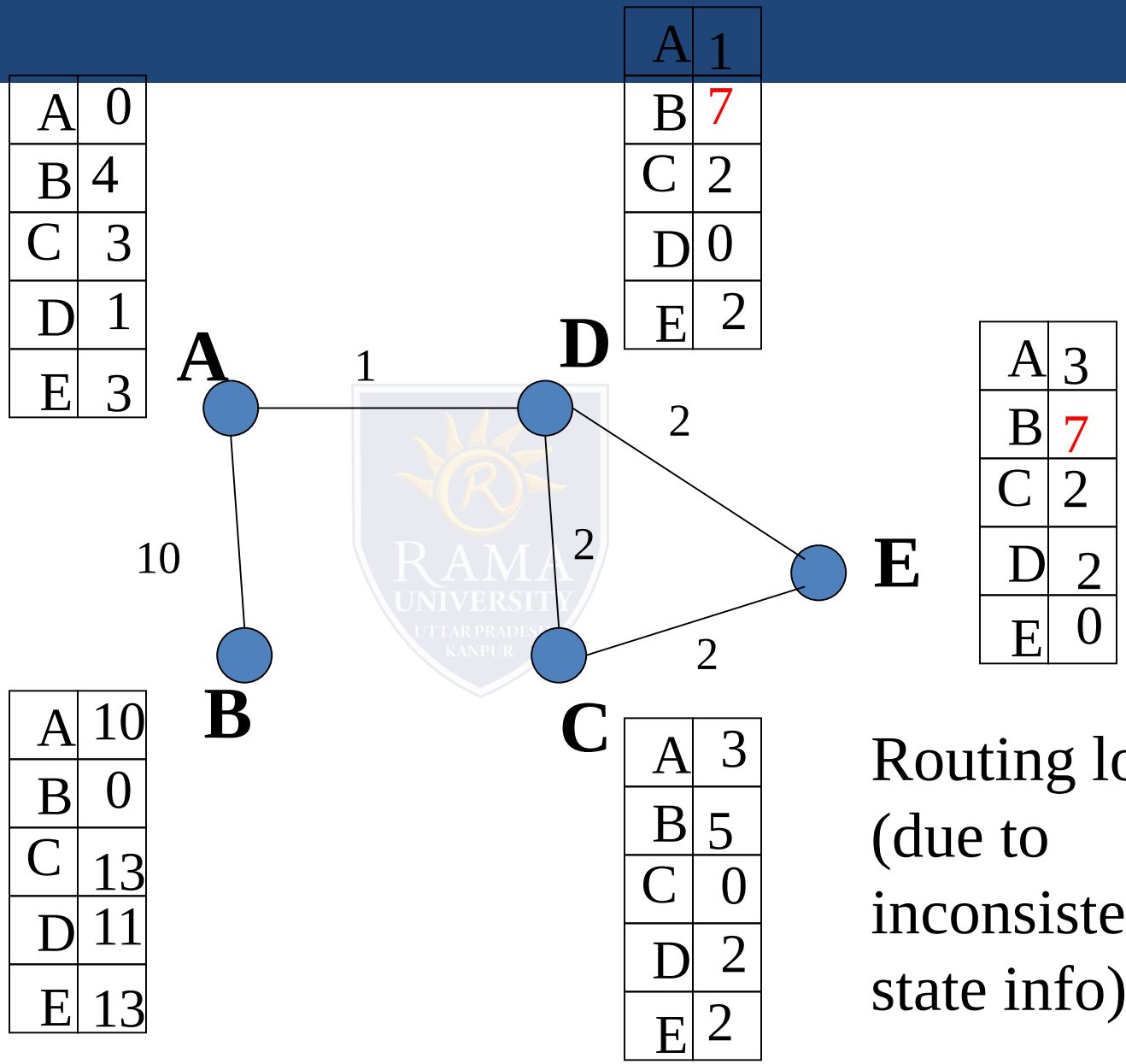


A	3
B	3
C	2
D	2
E	0

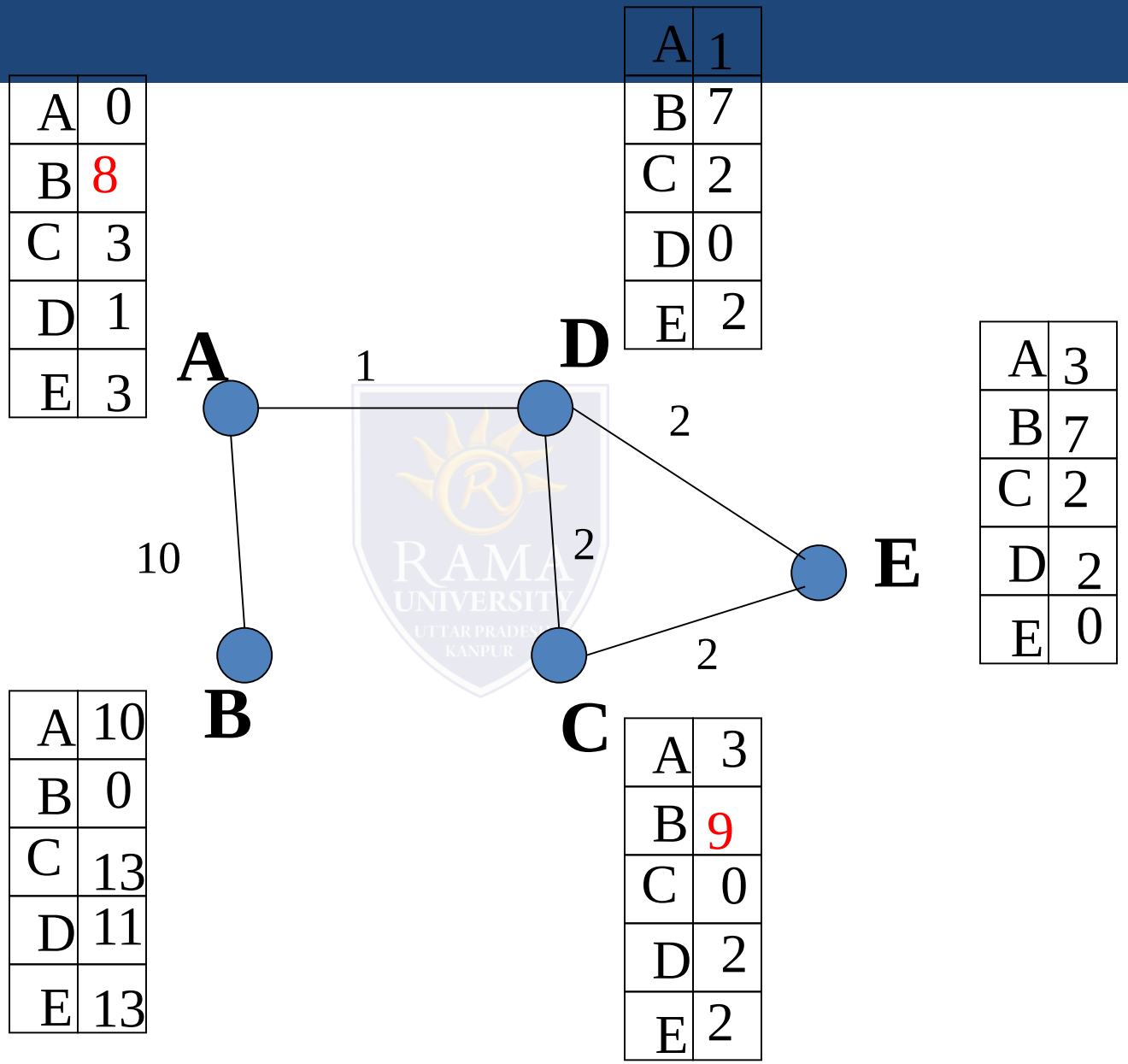
A	10
B	0
C	13
D	11
E	13

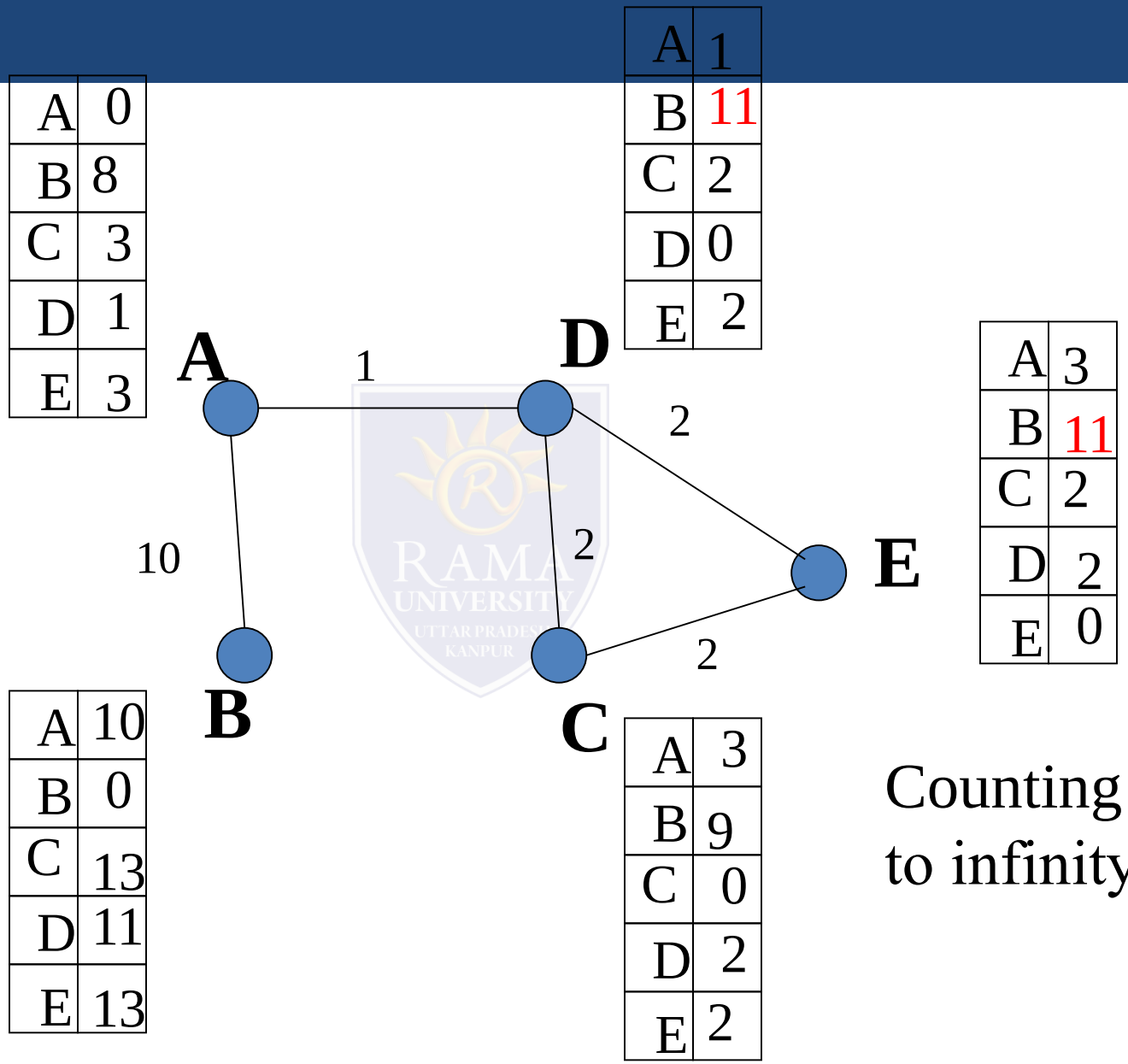
A	3
B	5
C	0
D	2
E	2

Get help from neighbours



Routing loop (due to inconsistent state info)

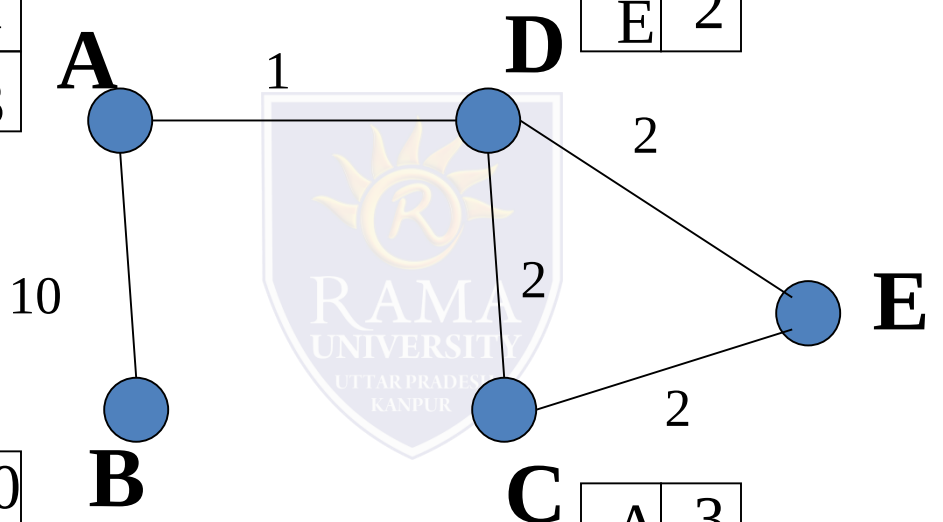

A
B
C
D
E
1
10
2
2
2
A 0
B 8
C 3
D 1
E 3
A 1
B 7
C 2
D 0
E 2
A 3
B 7
C 2
D 2
E 0
A 10
B 0
C 13
D 11
E 13
A 3
B 9
C 0
D 2
E 2



Counting to infinity…

A	0
B	10
C	3
D	1
E	3

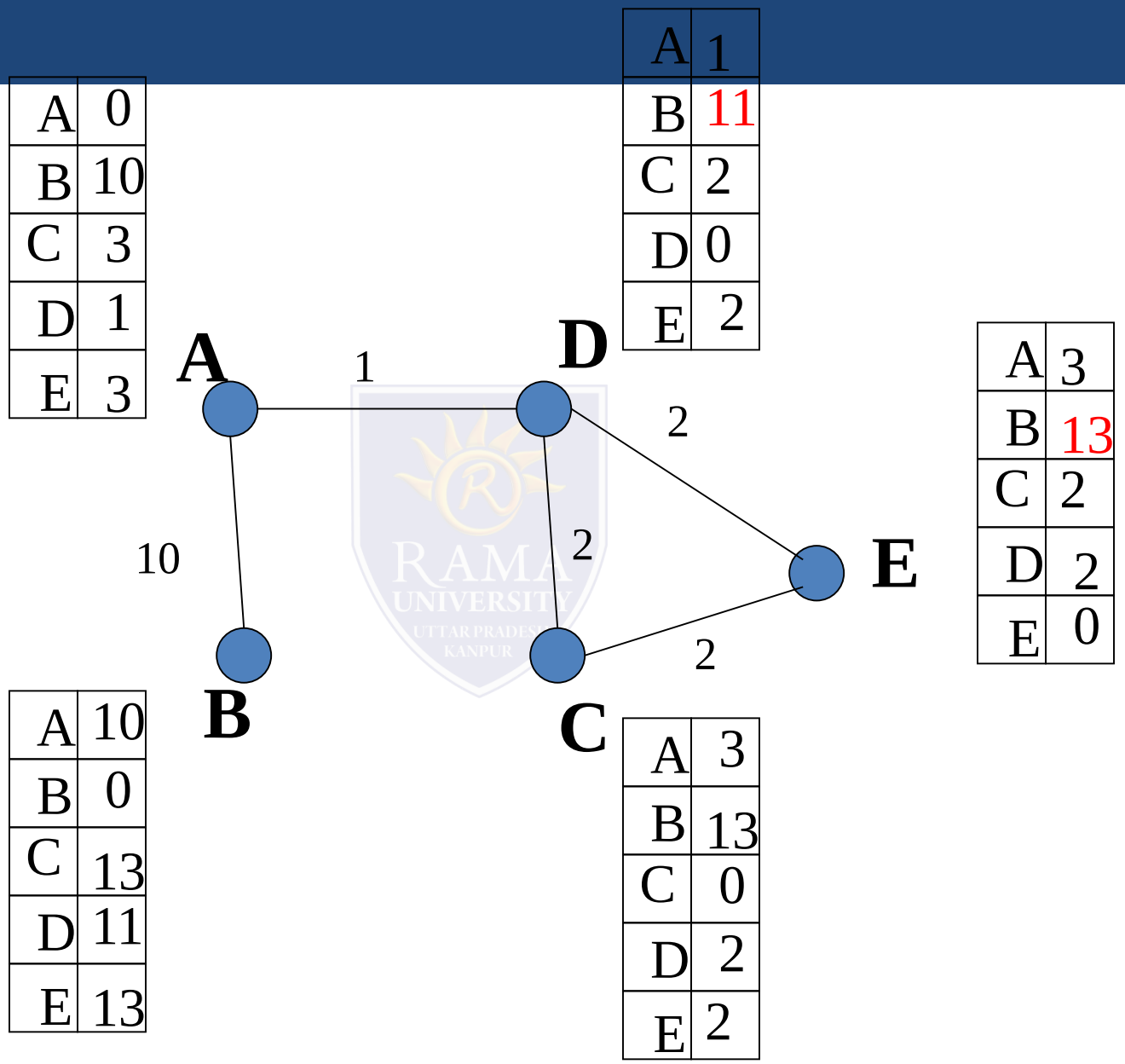
A	1
B	11
C	2
D	0
E	2



A	3
B	11
C	2
D	2
E	0

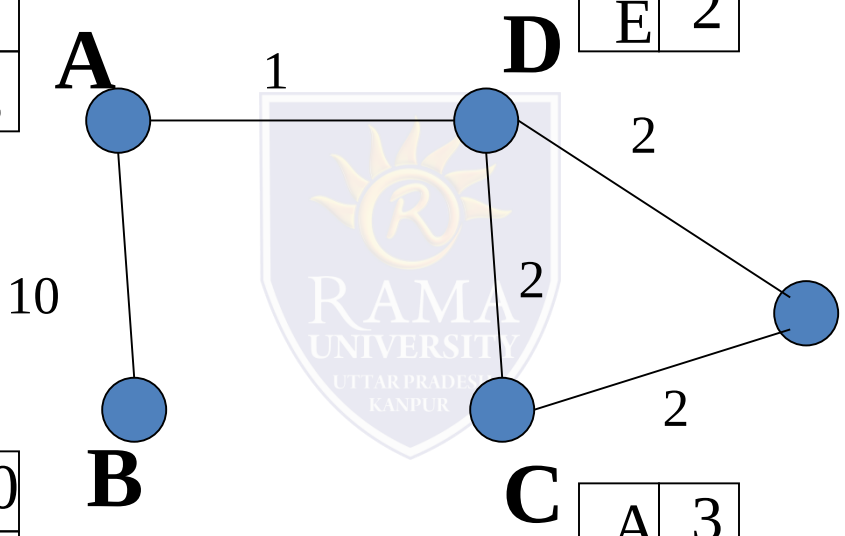
A	10
B	0
C	13
D	11
E	13

A	3
B	13
C	0
D	2
E	2


A
B
C
D
E
1
10
2
2
2
A 0
B 10
C 3
D 1
E 3
A 1
B 11
C 2
D 0
E 2
A 3
B 13
C 2
D 2
E 0
A 10
B 0
C 13
D 11
E 13
A 3
B 13
C 0
D 2
E 2

A	0
B	10
C	3
D	1
E	3

A	1
B	11
C	2
D	0
E	2



A	3
B	13
C	2
D	2
E	0

A	10
B	0
C	13
D	11
E	13

A	3
B	13
C	0
D	2
E	2

Stability again

Multiple Choice Question

MUTIPLE CHOICE QUESTIONS:

Sr no	Question	Option A	Option B	OptionC	OptionD
1	What is inter frame gap?	idle time between frames	idle time between frame bits	idle time between packets	idle time between networks
2	. An ethernet frame that is less than the IEEE 802.3 minimum length of 64 octets is called _____	short frame	runt frame	mini frame	man frame
3	What is the access point (AP) in a wireless LAN?	device that allows wireless devices to connect to a wired network	wireless devices itself	both device that allows wireless devices to connect to a wired network and wireless devices itself	all the nodes in the network
4	In wireless ad-hoc network _____	access point is not required	access point is must	nodes are not required	all nodes are access points
5	Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?	CDMA	CSMA/CA	ALOHA	CSMA/CD

REFERENCES

- http://www.engppt.com/2009/12/networking-fourozan-ppt-slides.html