CS & IT ENGINEERING

Computer Networks

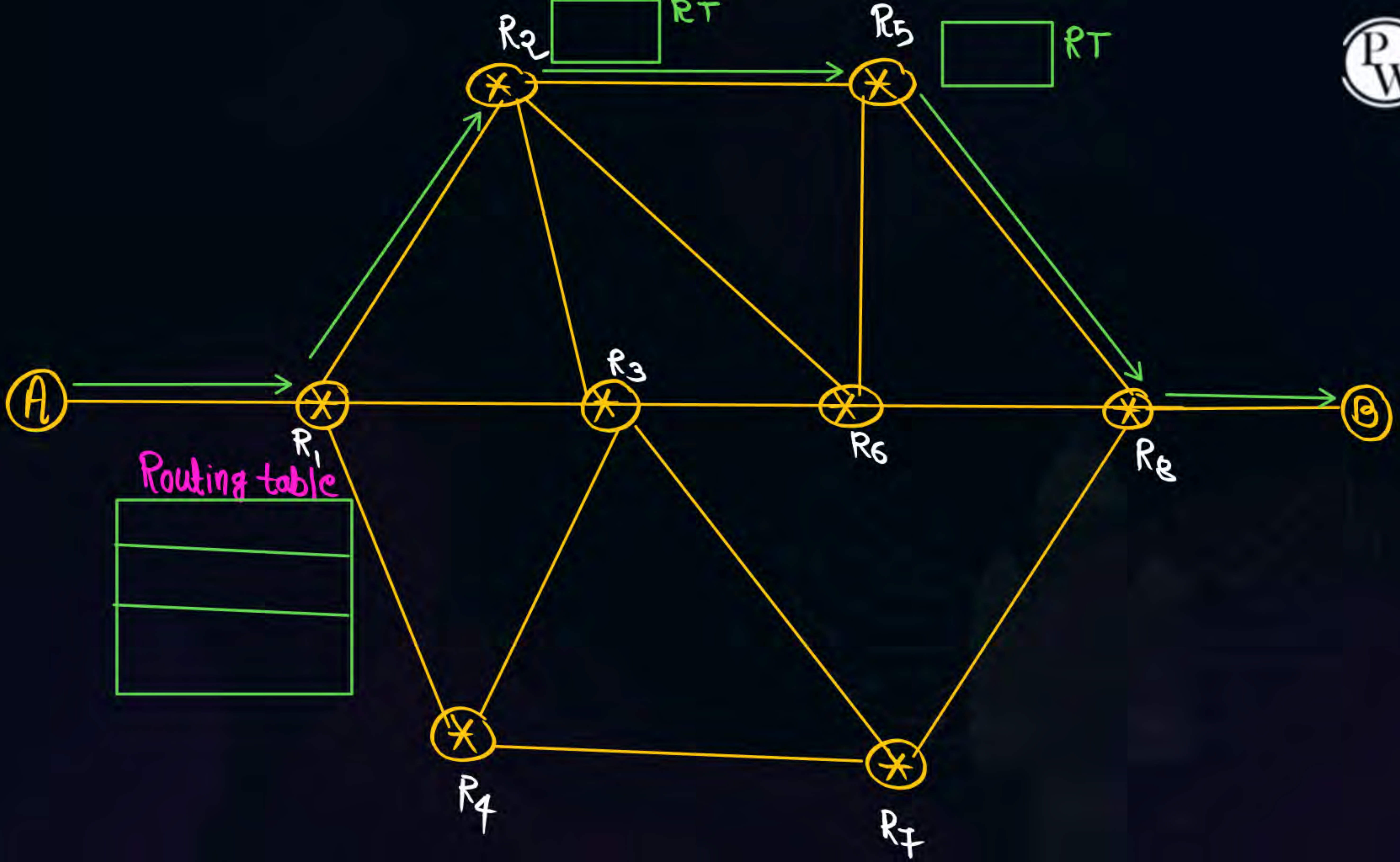
Routing Protocols

Lecture No.- 01

By- Ankit Doyla Sir

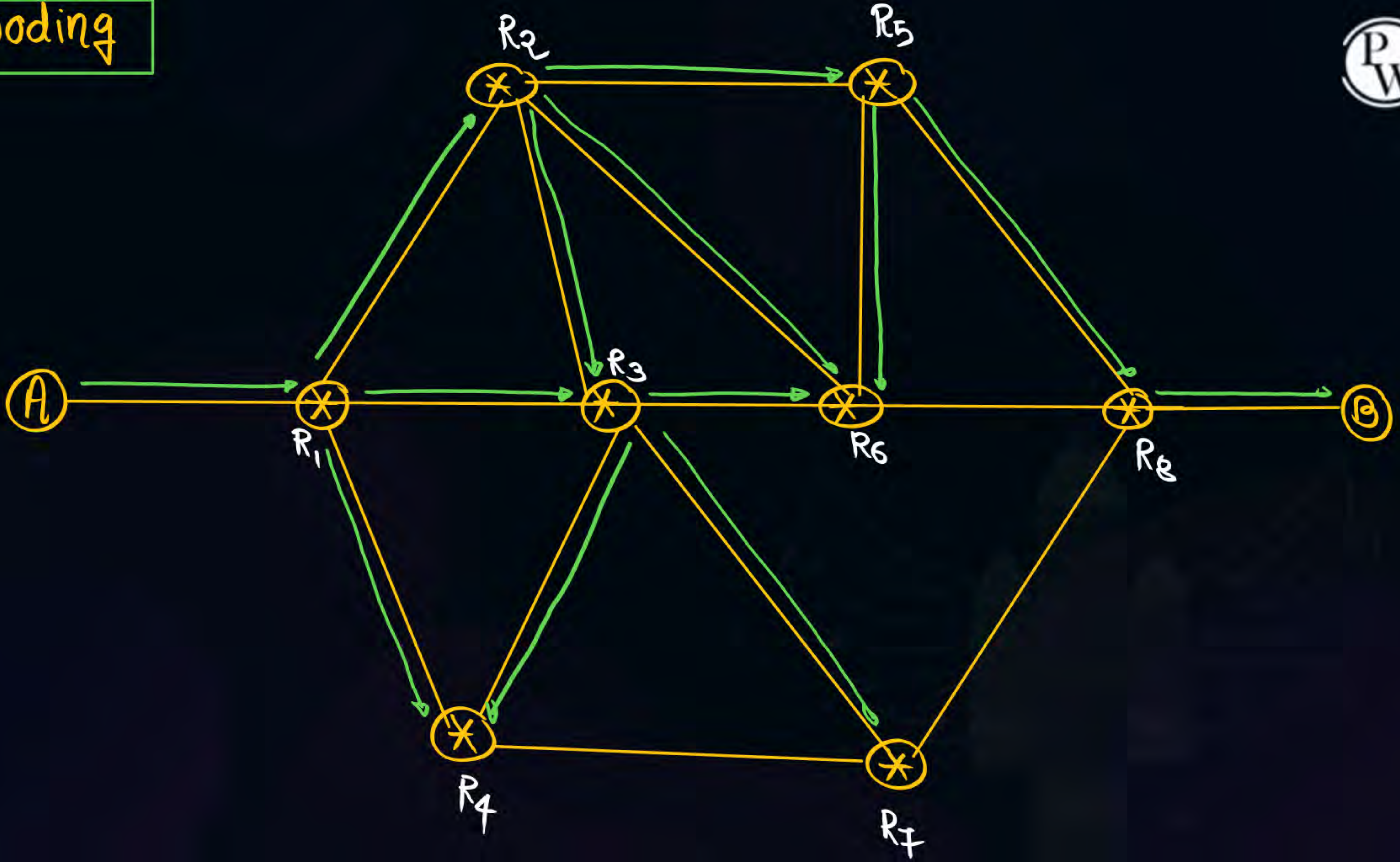
Topics to be Covered

- **Topic** Routing Algorithm
- **Topic** Distance Vector Routing



R2
RT
R5
RT
A
R1
R3
R6
R8
B
Routing table
R4
R7

Flooding



Topic : Flooding

Flooding is simple computer network Routing Algorithm in which every incoming packet is sent through every outgoing link except one it arrived on.

Topic : Advantage of Flooding

1. No Routing is required
2. Shortest path is always guarantee i.e. the packet arrives at the destination first
3. It is highly Reliable , if one path is down then the packet reach at the destination by choosing another path.

Topic : Disadvantage of Flooding

1. Traffic is very high
2. Many duplicate packets received by receiver

Topic : Advantage of Routing

1. Traffic is very less.
2. No duplicate packet received by receiver.

Topic : Disadvantage of Routing

1. Routing table is required.
2. Chosen path may be down so it is not highly Reliable.
3. Shortest path is depends on the algorithm and some algorithms fails to find the shortest path.

Routing Algorithm

- Static
  - XXXXX
- Dynamic
  - Distance Vector routing
    1980's
  - Link state Routing
    1990's

Distance Vector Routing

Topic : Distance Vector Routing : (1980)

Routing Table

Destination	Distance	Next Hop

Step 1:

Prepare the Routing table at every Router Based on the local knowledge.

RT OF D

Dest.	Dis.	NH
A	1	A
B	7	B
C	11	C
D	0	D

Dest.	Dis.	NH
A	0	A
B	2	B
C	∞	—
D	1	D

Routing table of A

RT OF C

Dest.	Dis.	NH
A	∞	—
B	3	B
C	0	C
D	11	D

Dest.	Dis.	NH
A	2	A
B	0	B
C	3	C
D	7	D

RT OF B

Step 2:

At A

A Receive Distance vector from B, D

At B

B Receive Distance vector from A, C, D

At C

C Receive Distance vector from B, D

At D

D Receive distance from A, B, C

At A

A Receive Distance Vector From B, D

From B	From D
2	1
0	7
3	11
7	0

$$A \rightarrow B = \min \begin{cases} A \xrightarrow{2} B + B \overset{0}{\rightsquigarrow} B \\ \text{or} \\ A \xrightarrow[1]{} D + D \underset{7}{\rightsquigarrow} B \end{cases}$$

$$= \min(2, 8) = 2$$

New Routing table of A

Dest.	Dis.	NH
A	0	A
B	2	B
C	5	B
D	1	D

$$A \rightarrow C = \min \begin{cases} A \xrightarrow{2} B + B \overset{3}{\rightsquigarrow} C \\ \text{or} \\ A \xrightarrow[1]{} D + D \underset{11}{\rightsquigarrow} C \end{cases}$$

$$= \min\{5, 12) = 5$$

$$A \rightarrow D = \min \begin{cases} A \xrightarrow{1} D + D \overset{0}{\rightsquigarrow} D \\ \text{or} \\ A \xrightarrow[2]{} B + B \underset{7}{\rightsquigarrow} D \end{cases}$$

$$= \min(1, 9) = 1$$

AD Rule (shortcut)

At A

A Receive DV From B, D

From-B	From-D
2	1
0	7
3	11
7	0

AB = 2

$0+2=2$

$3+2=5$

$7+2=9$

AD = 1

$7+1=8$

$11+1=12$

$0+1=1$

New Routing table OF A

Destin.	Dis.	NH
A	0	A
B	2	B
C	5	B
D	1	D

At B

B Receive Distance Vector A, C, D

From-A	From-C	From-D
0	∞	1
2	3	7
∞	0	11
1	11	0

$BA = 2$

$0+2=2$

$\infty+2=\infty$

$1+2=3$

$BC = 3$

$\infty+3=\infty$

$0+3=3$

$11+3=14$

$BD = 7$

$1+7=8$

$11+7=18$

$0+7=7$

New Routing table of B

Dest.	Dis.	NH
A	2	A
B	0	B
C	3	C
D	3	A

At C: New Routing table

Dest.	Dis	NH
A	5	B
B	3	B
C	0	C
D	10	B

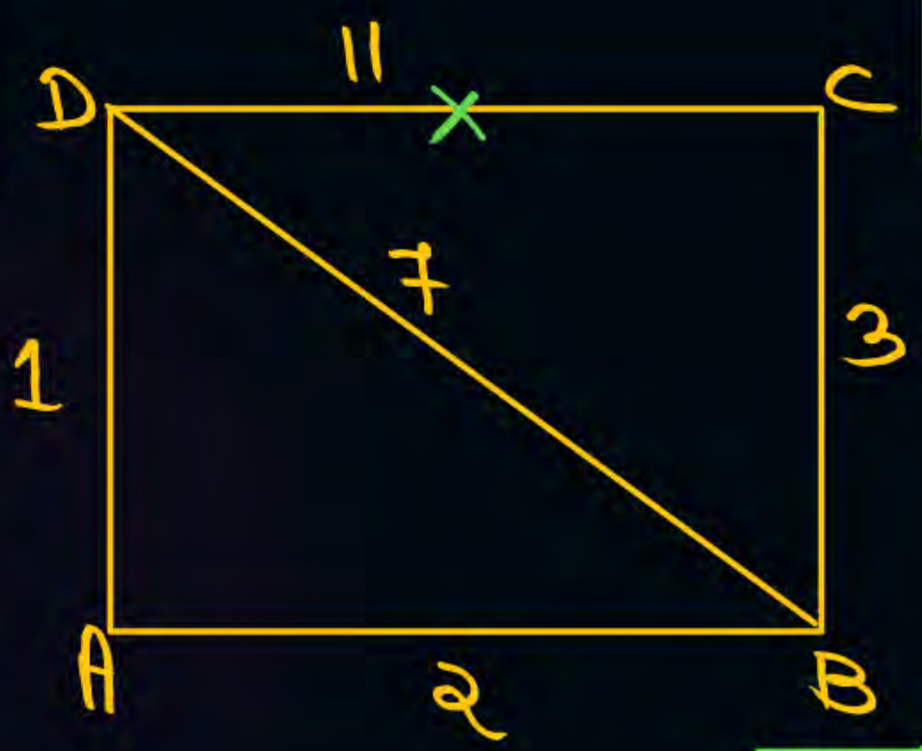
At D: New Routing table

Dest.	Dis	NH
A	1	A
B	3	A
C	10	B
D	0	D

Slide

Final Routing table in one step

Des.	Dis.	NH
A	1	A
B	3	A
C	3	A
D	0	D

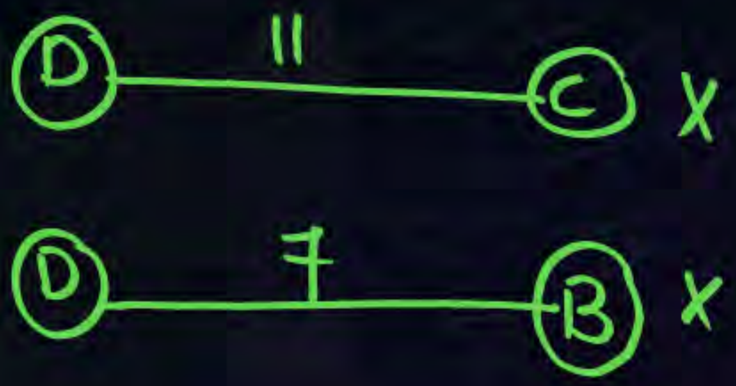


Des.	Dis.	NH
A	5	B
B	3	B
C	0	C
D	6	B

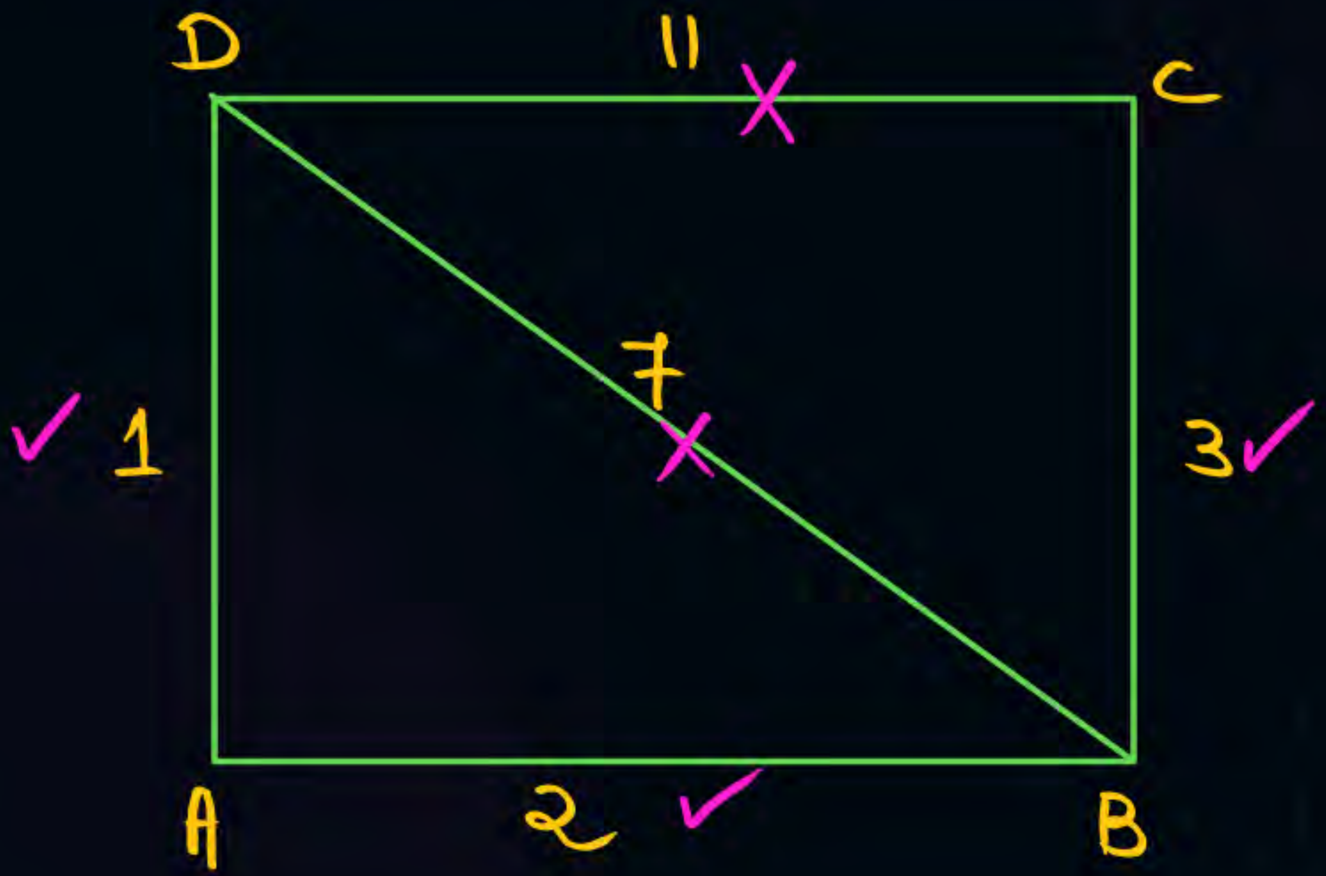
Des.	Dis	NH
A	0	A
B	2	B
C	5	B
D	1	D

Dest	Dis.	NH
A	2	A
B	0	B
C	3	C
D	3	A

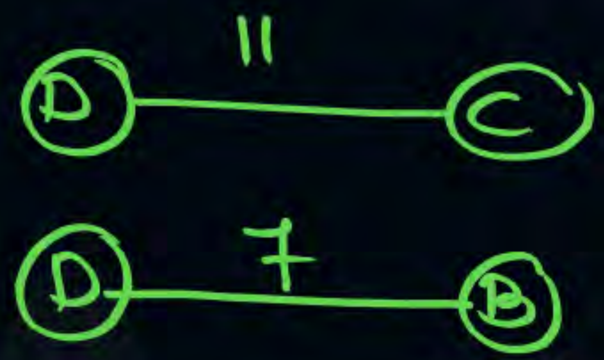
"edges which are Not included in any Routing table"



Q: edge which are Not used ?



Ans:



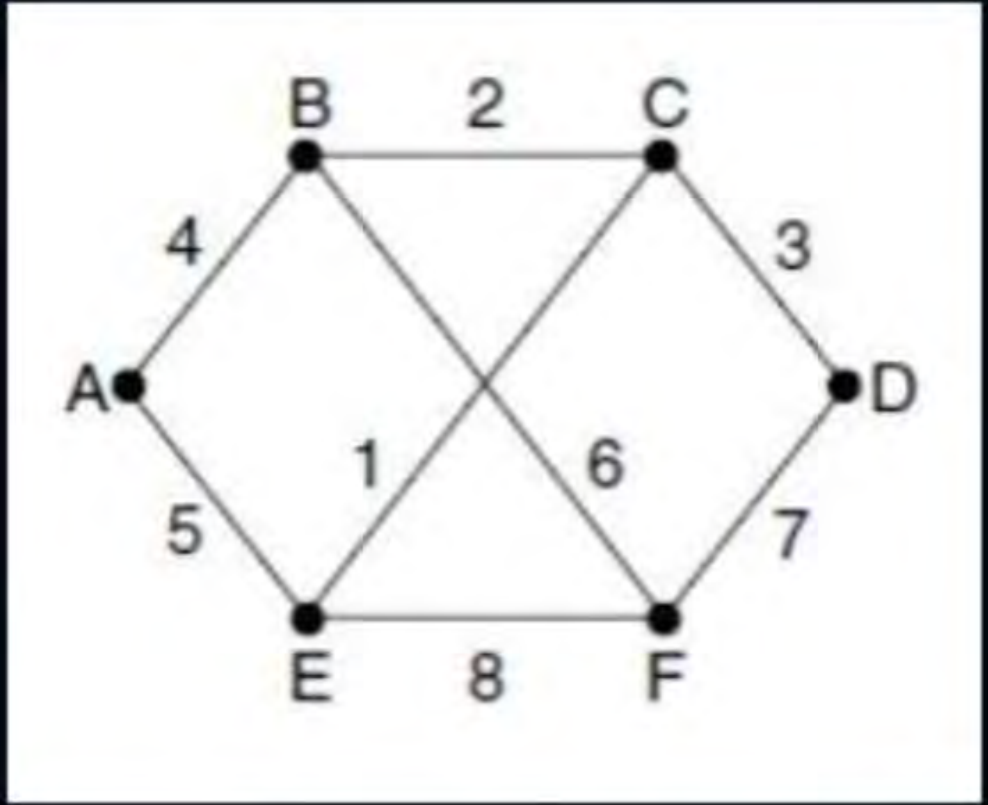
Problem Solving

On

DVR

Topic : Problem Solving on DVR

Q.4 Consider the network of 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, are 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the cost



Slide

Gate 2010

$4M = 2M + 2M$ Common data Question

Consider a network with 6 routers R1 to R6 connected with links having weights as shown in the following diagram

At R_4

R_4 to R_5, R_6

At R_5

R_5 to R_6

At R_1

R_1 to R_2, R_3, R_4, R_5, R_6

At R_2

R_2 to R_3, R_4, R_5, R_6

At R_3

R_3 to R_4, R_5, R_6

Topic : Problem Solving on DVR

Q. 1 All the routers use the distance vector-based routing algorithm to update their routing tables. Each router starts with its routing table initialized to contain an entry for each neighbor with the weight of the respective connecting link. After all the routing tables stabilize, how many links in the network will never be used for carrying any data?

A. 4

B. 3

C. 2

D. 1

Topic : Problem Solving on DVR

Q.2 Suppose the weights of all unused links in the previous question are changed to 2 and the distance vector algorithm is used again until all routing tables stabilize. How many links will now remain unused?

A. 0

B. 1

C. 2

D. 3

Topic : Problem Solving on DVR

Q.3 Consider the following subnet. If distance vector routing is used, how many link can never by used after all the routing table. Are stabilized ?

Topic : Disadvantage of DVR

#Q. Consider the following statement about routing information protocol (RIP) and open shortest path (OSPF) in an ipv4 network

A. RIP uses distance vector routing

B. RIP Packet are sent using UDP

C. OSPF packet are sent using TCP

D. OSPF operation is based on link state routing

THANK - YOU