

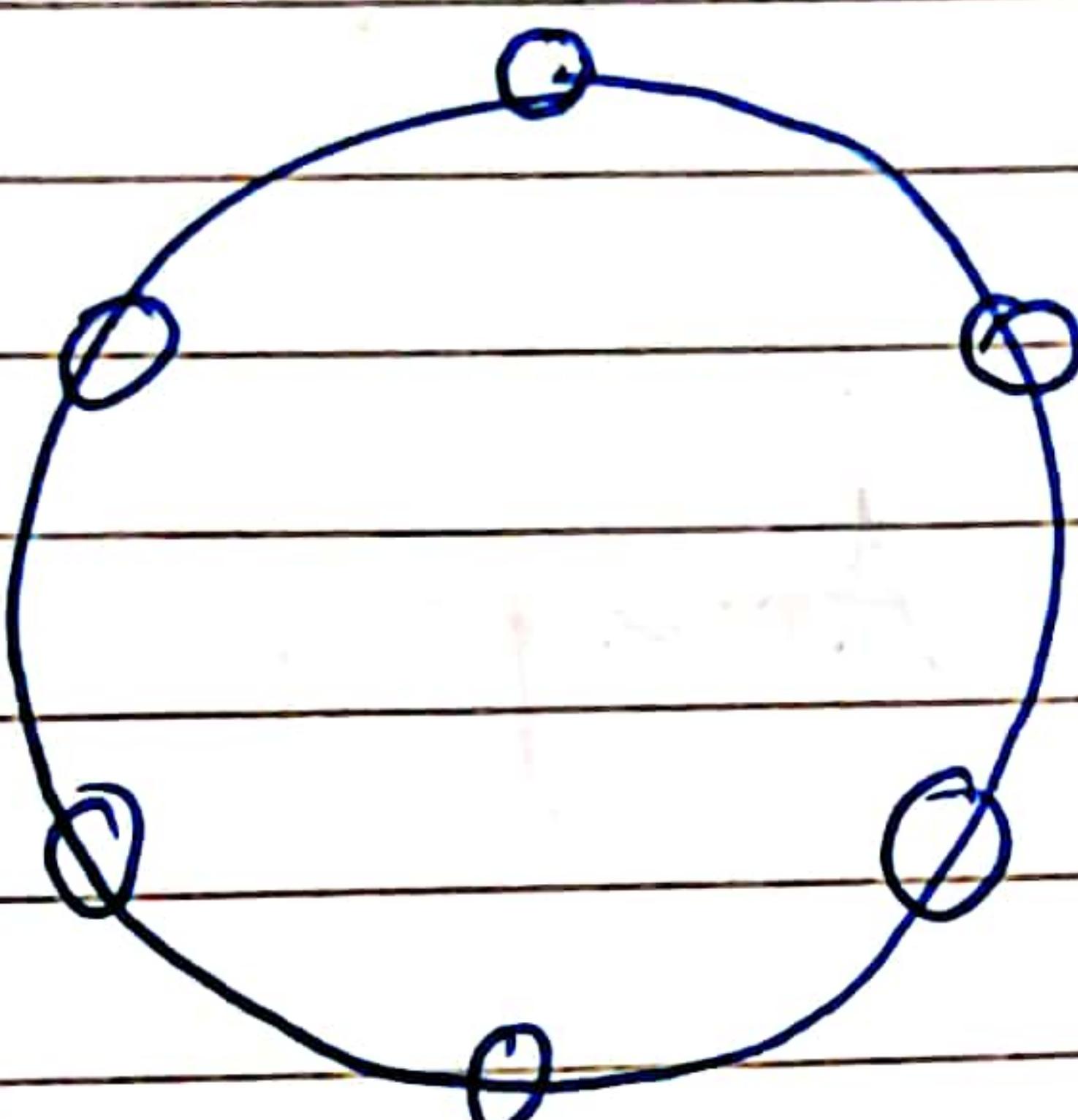
One dimensional

L-15

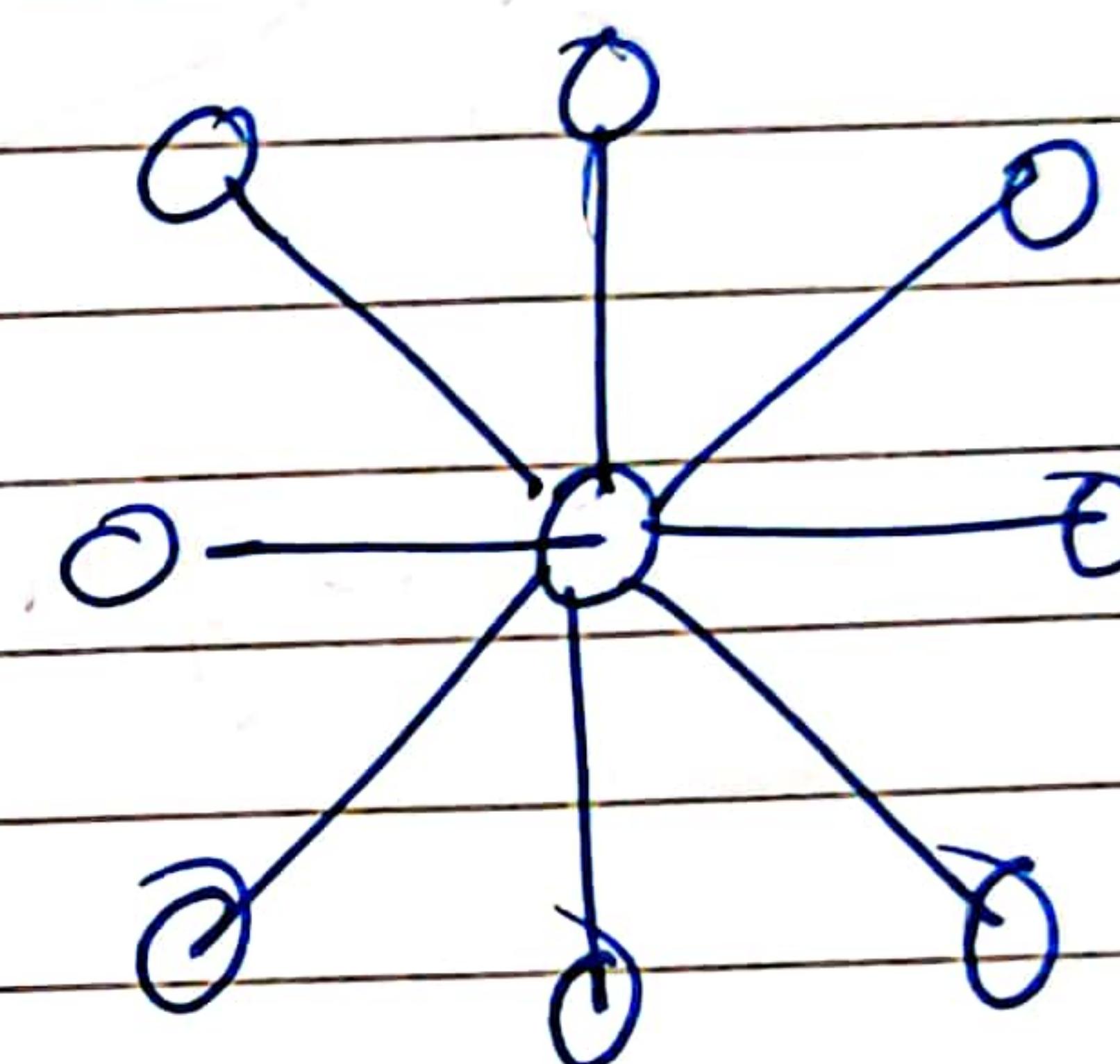


Linear array .

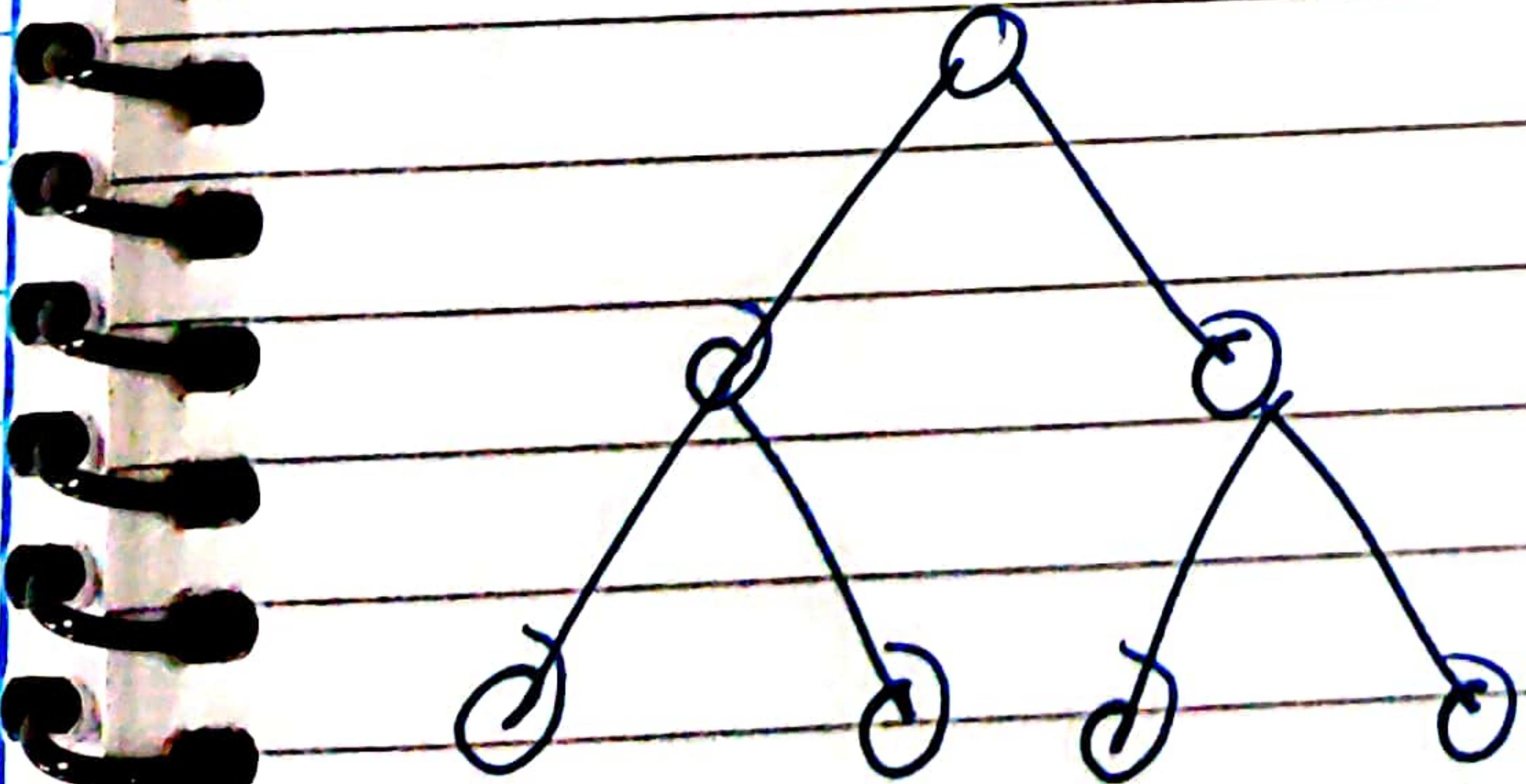
Two dimensional



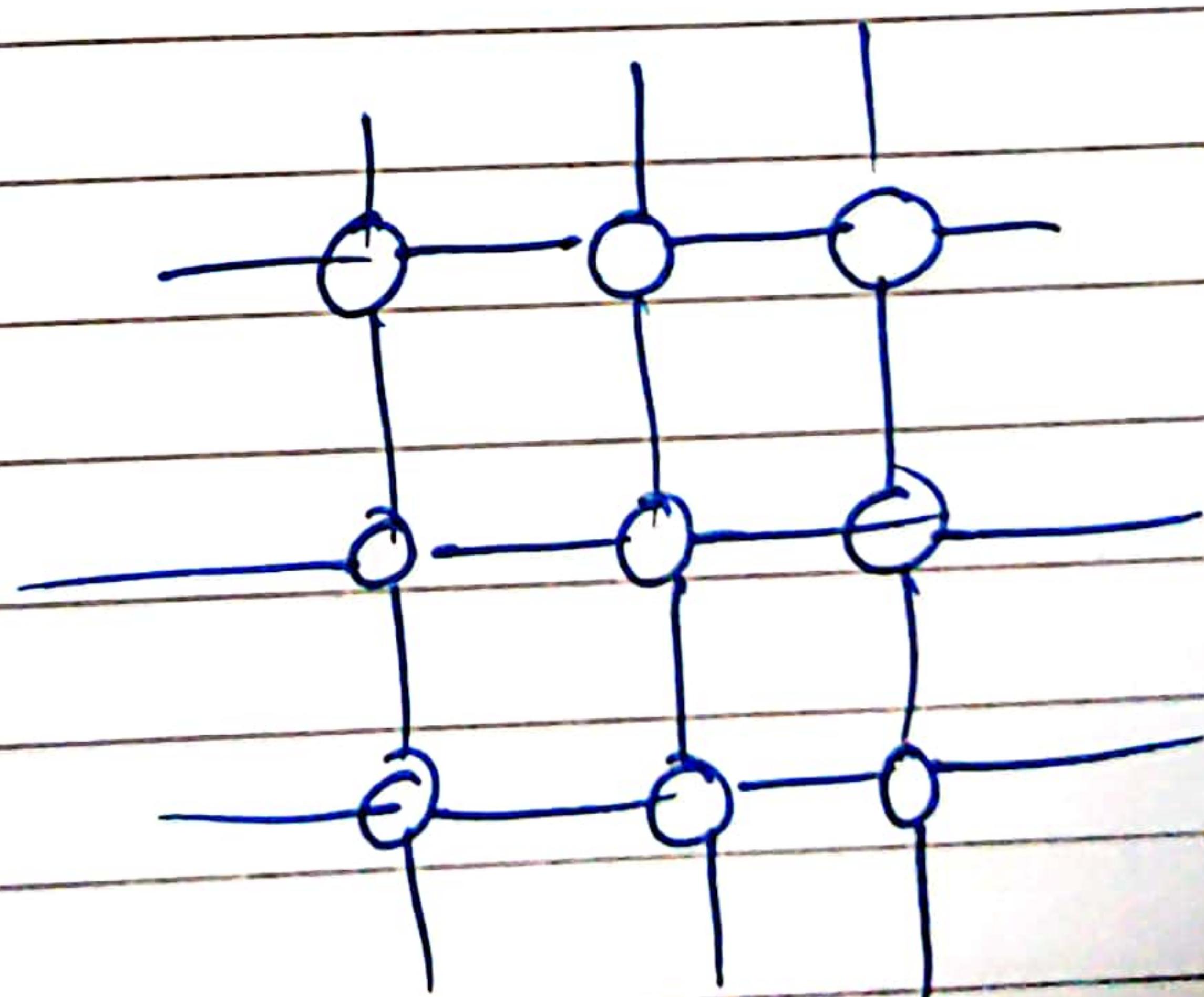
Ring .



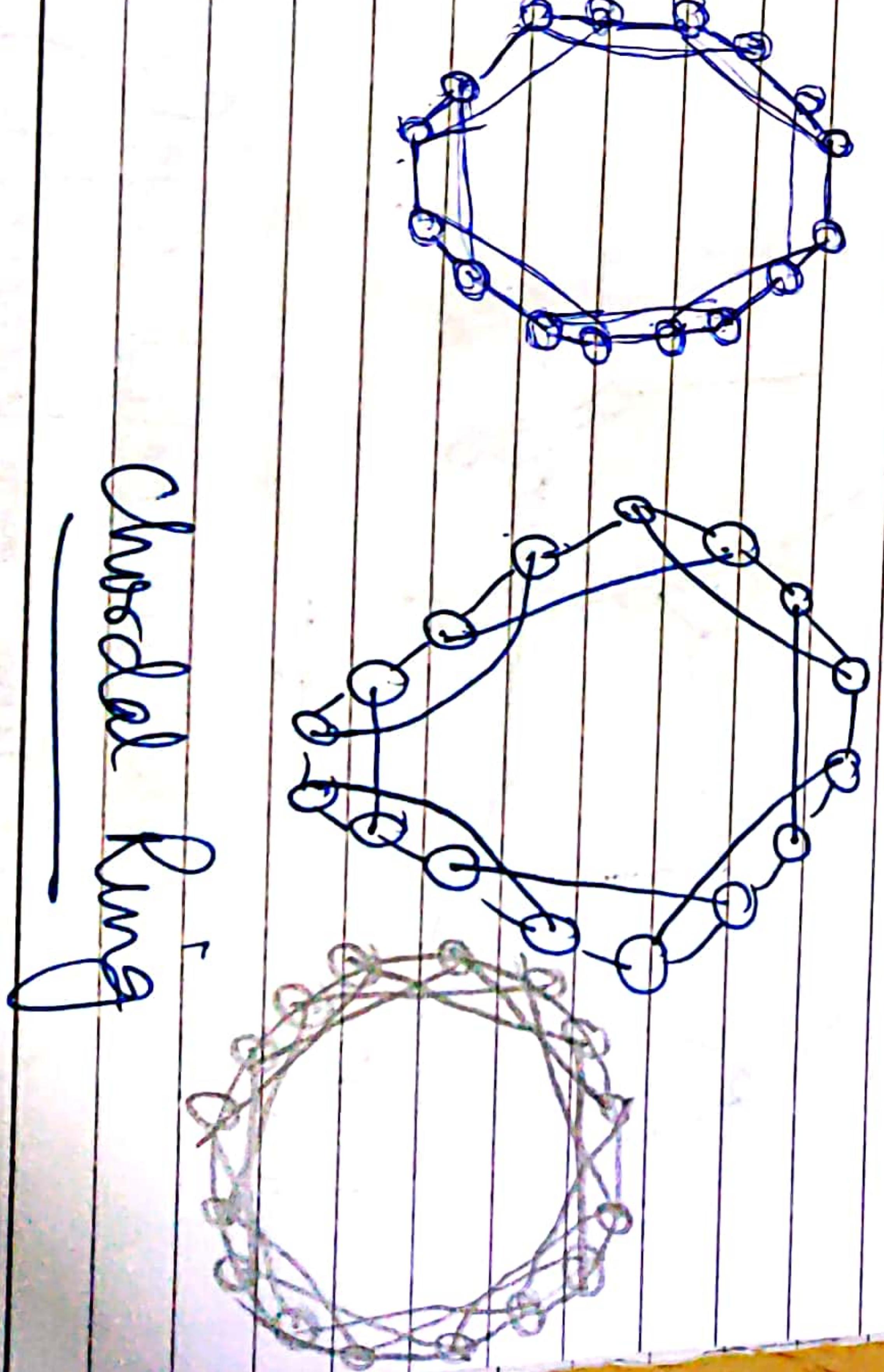
Star



Tree

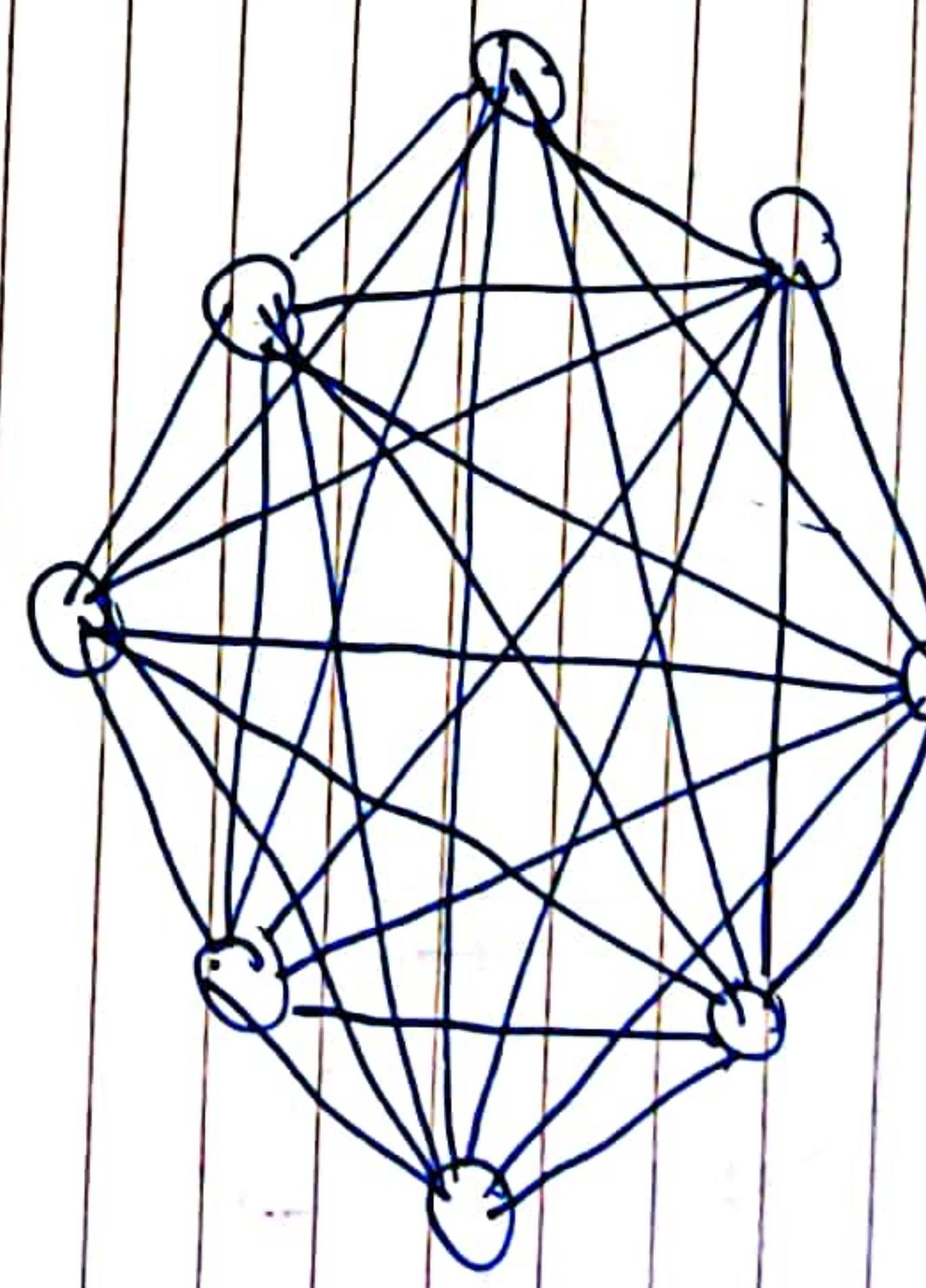


~~Nearest neighbor~~
Mesh

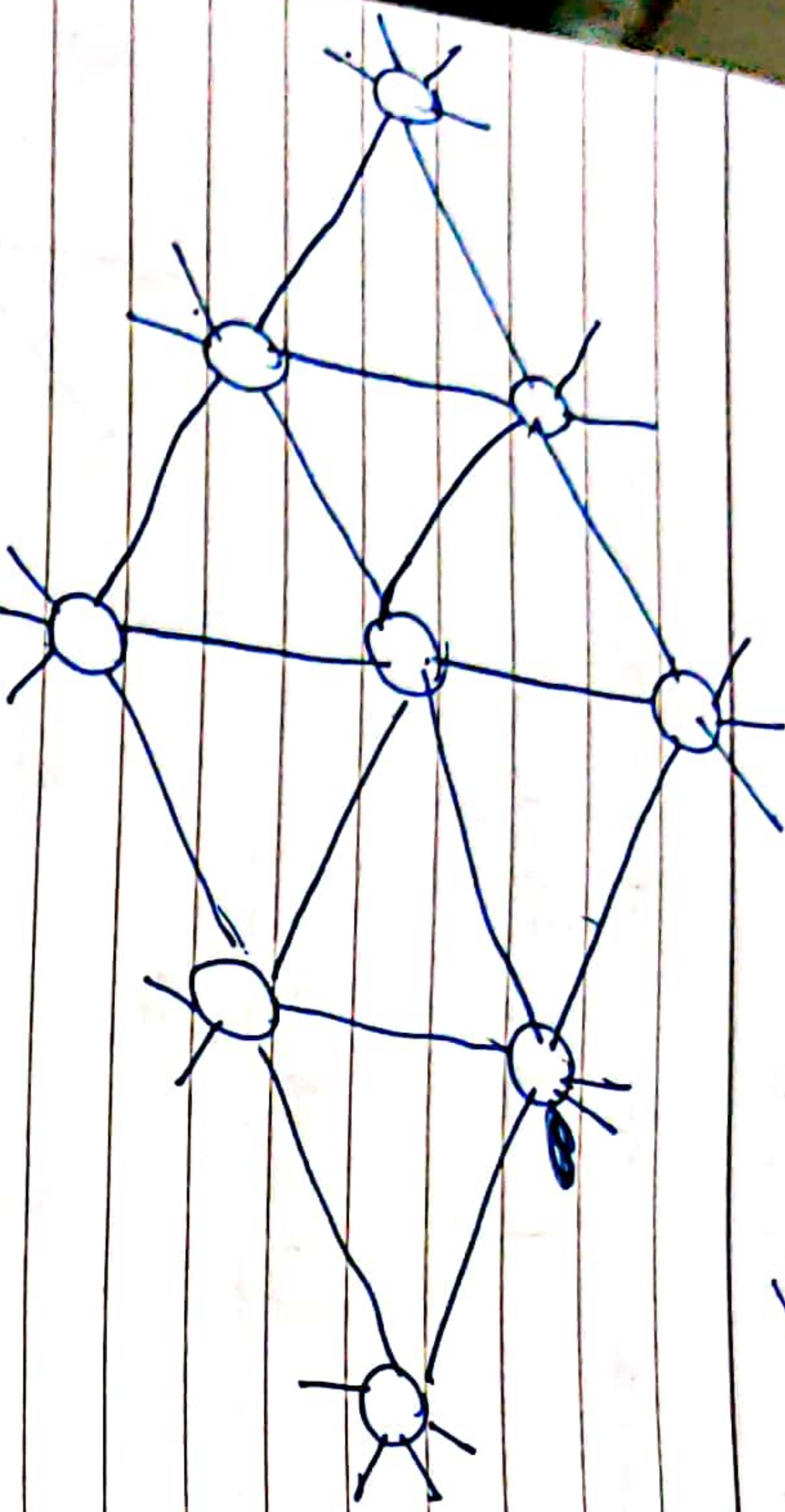


16 nodes.

Completely Connected



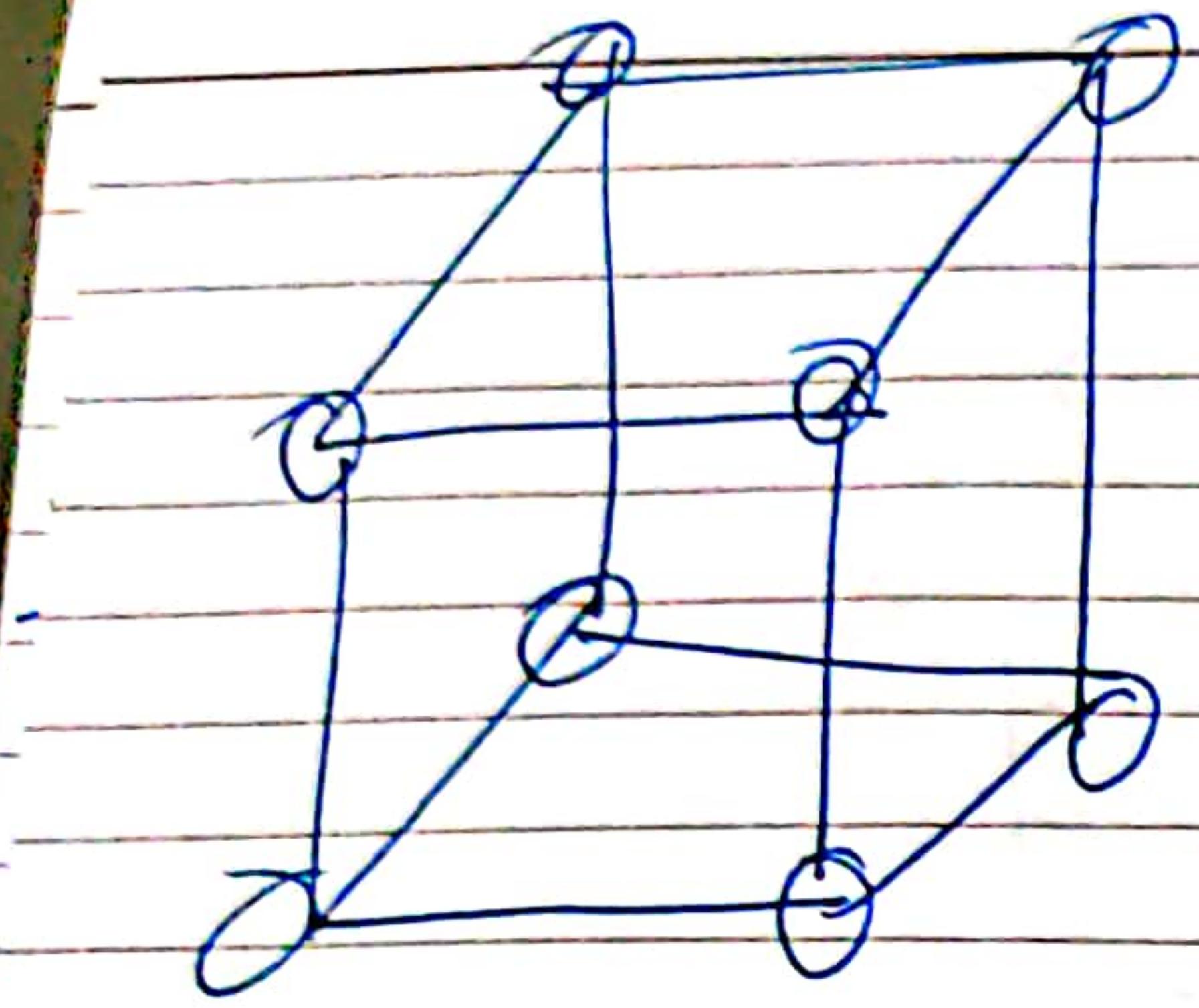
Systolic Array.



L-15

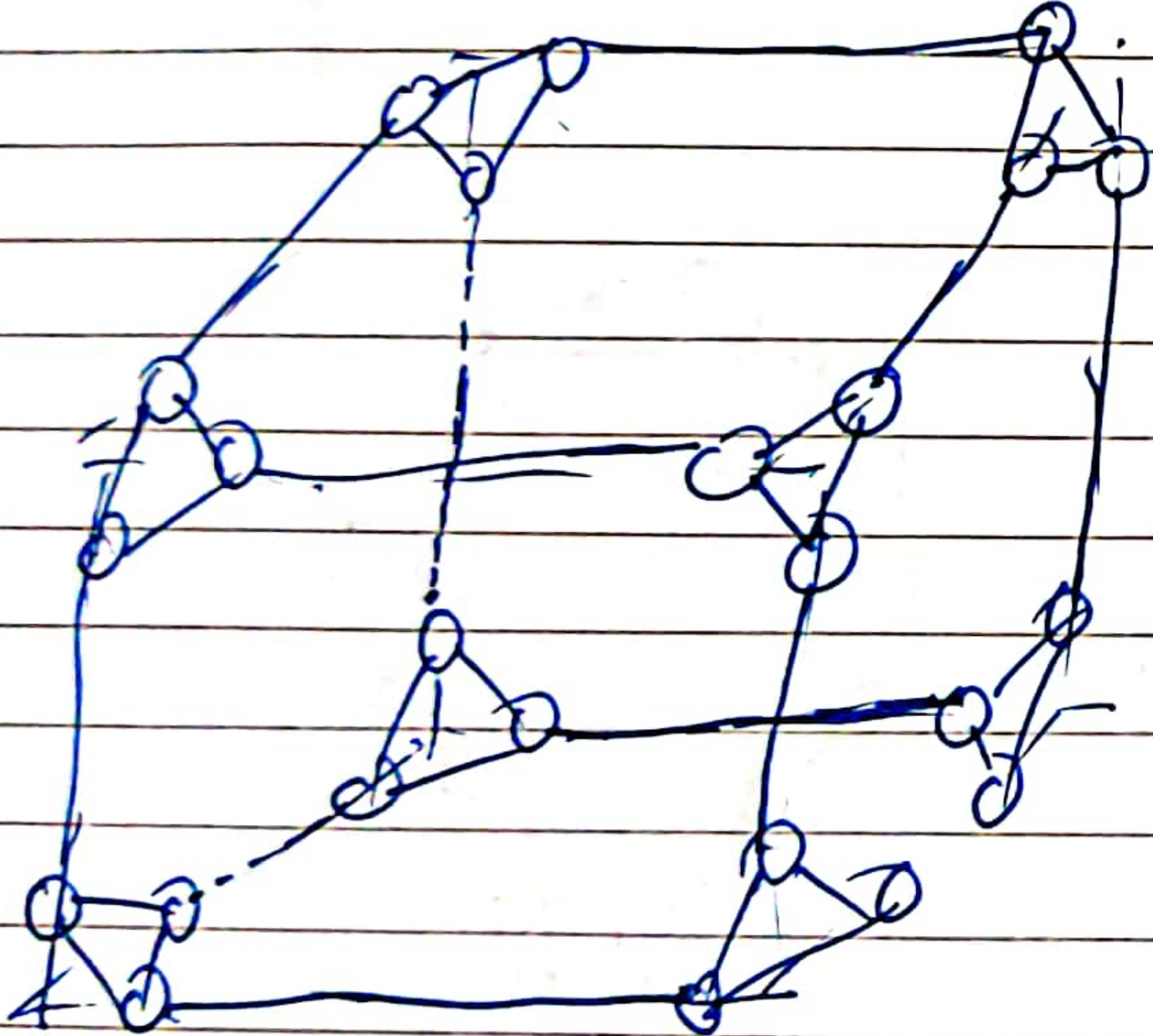
3-Dimensional

L-15



3 - Cube

V-15

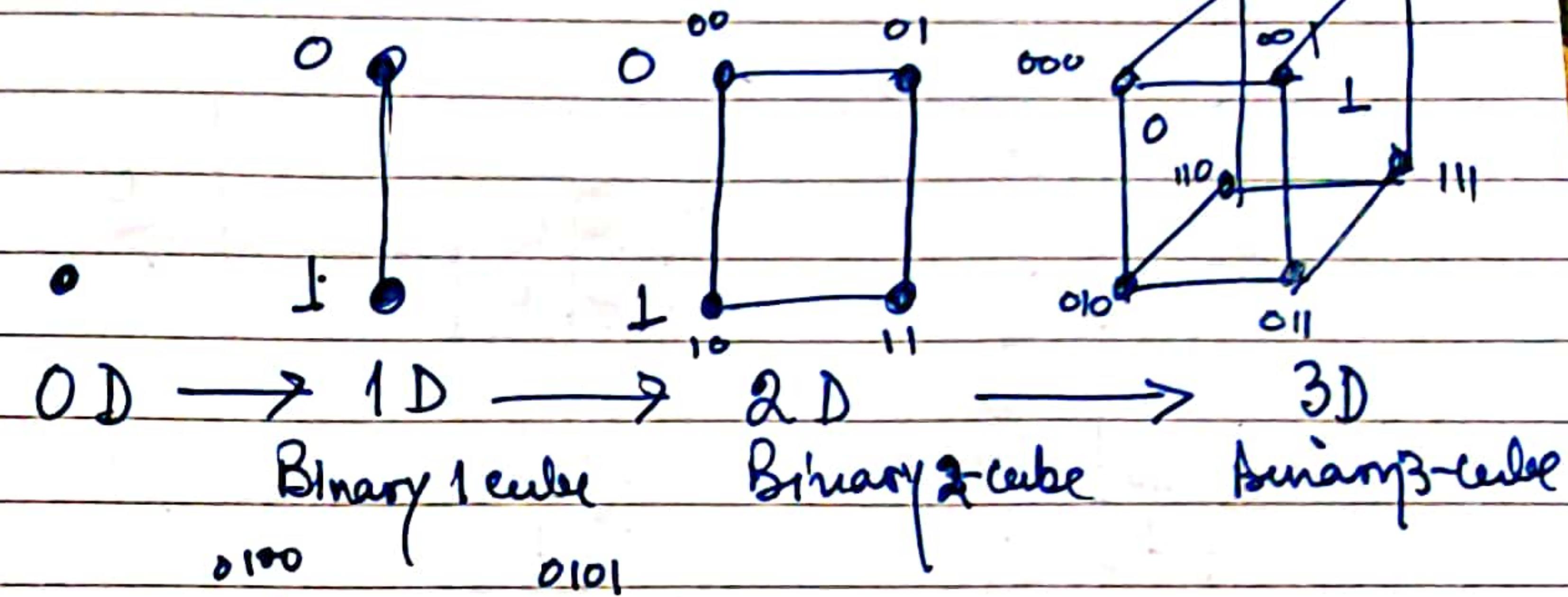


3 cube connected cycle

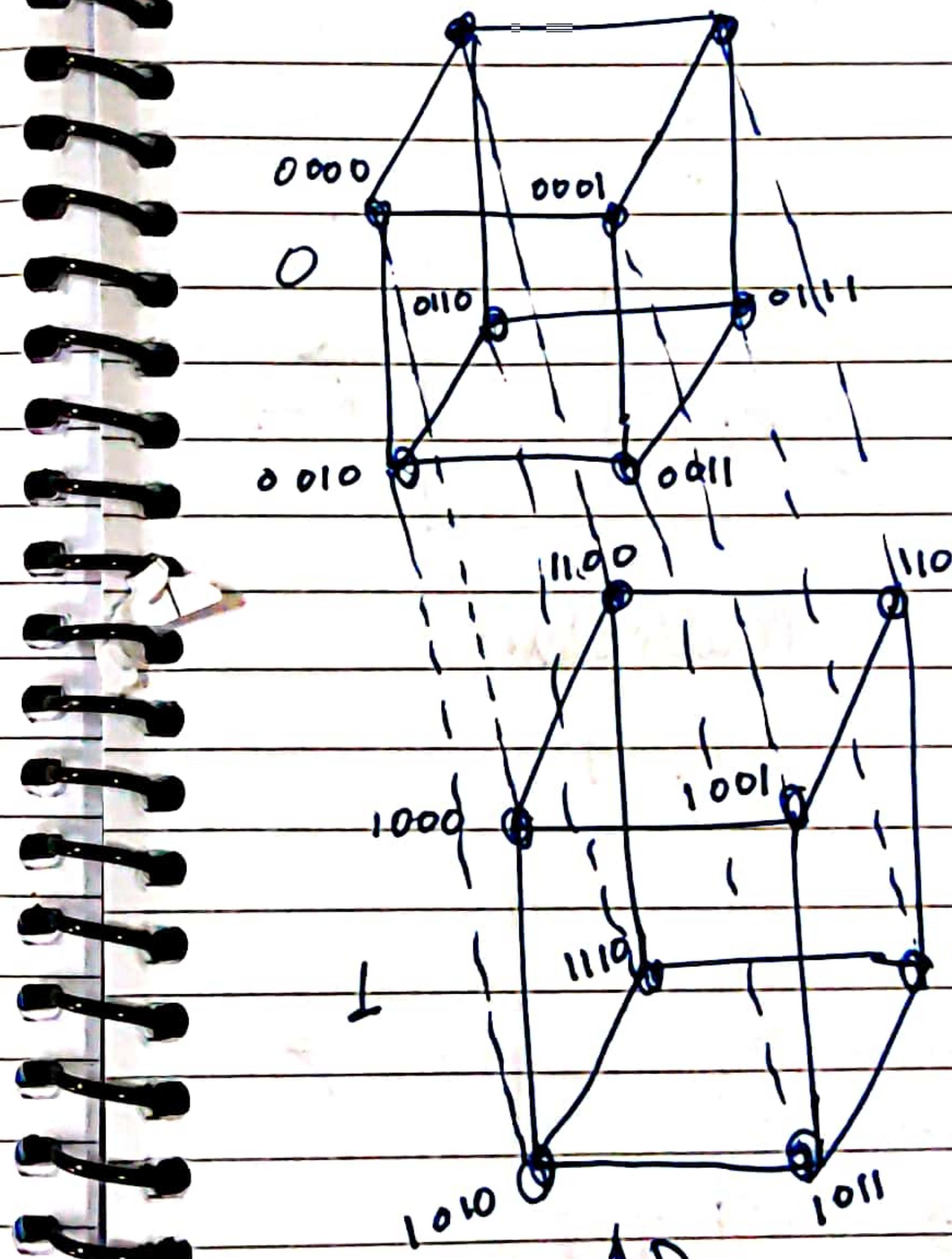
(a deviation from hypercube)

(obtained from the 3-cube)

Hypercube



0D → 1D → 2D → 3D
Binary 1-cube Binary 2-cube Binary 3-cube



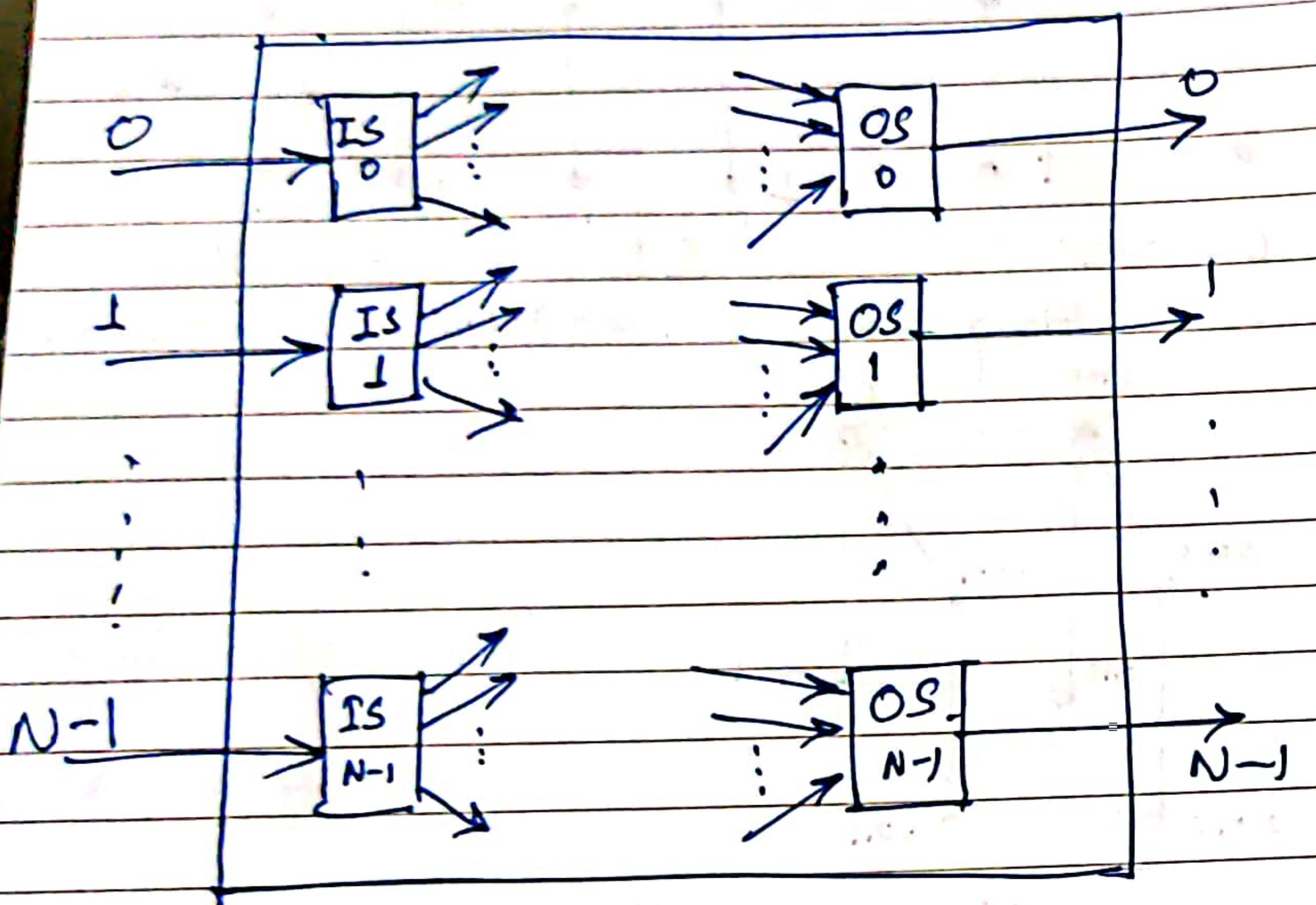
Mesh \Rightarrow 2D hypercube

3 cube \Rightarrow 3D hypercube

Recursive
structure
of
binary
hypercube.

AD

Single Stage Dynamic Network

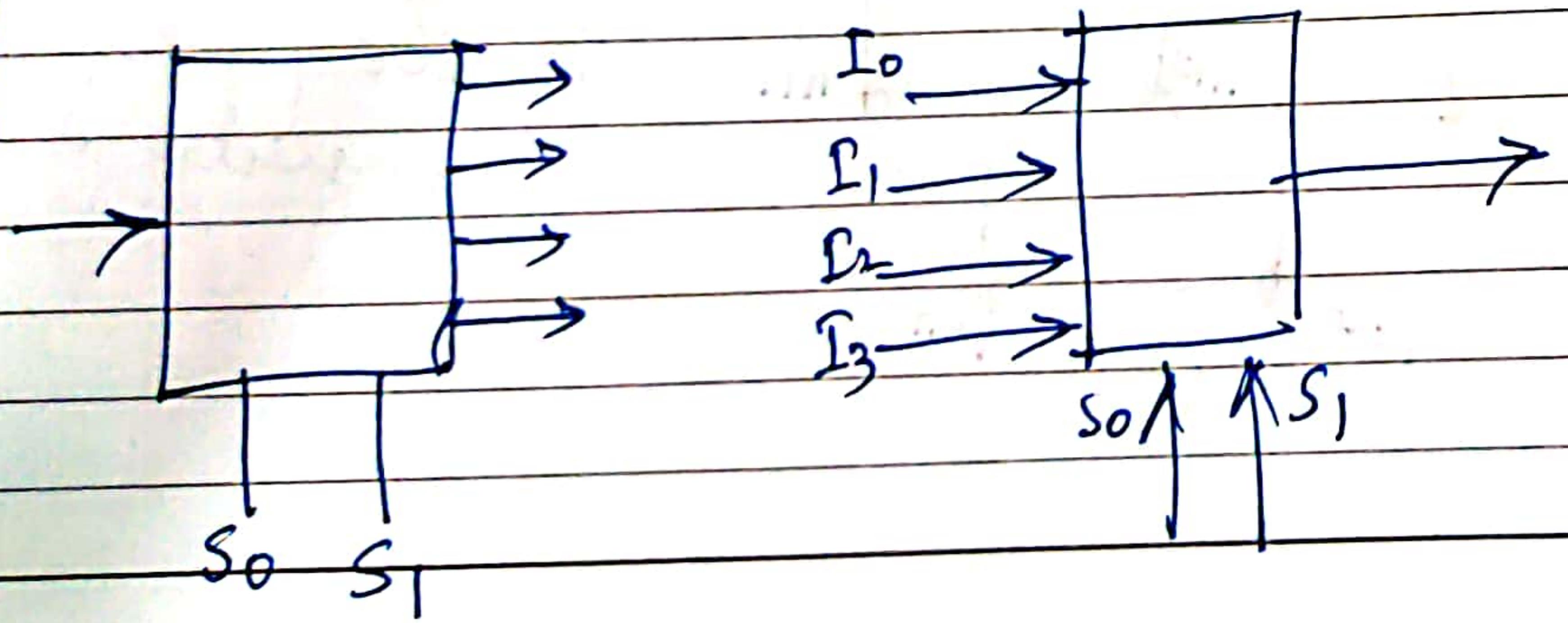


Demultiplexer

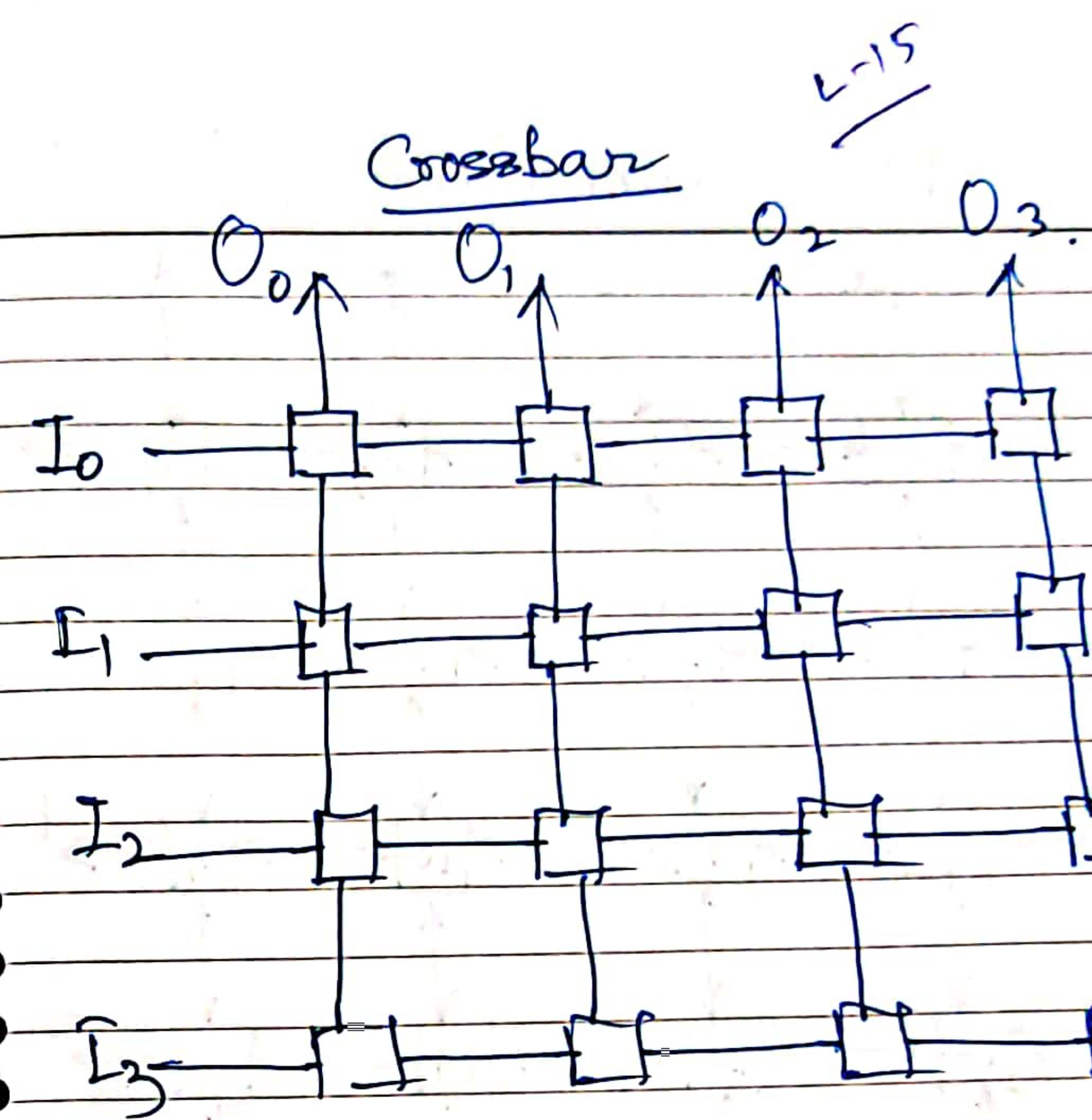
$I - D$

Multiplexer

$M - 1$



Crossbar



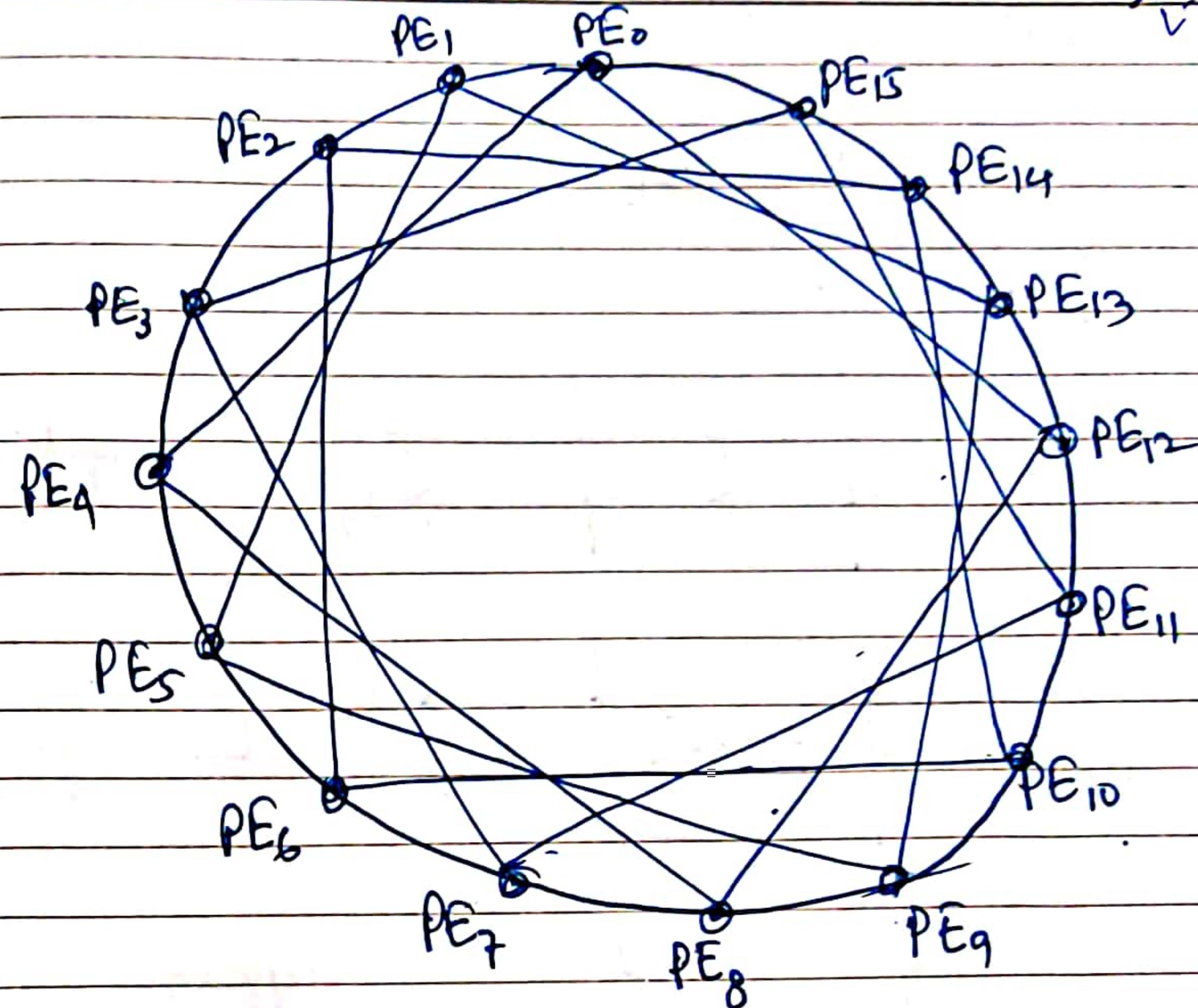
$V - 15$



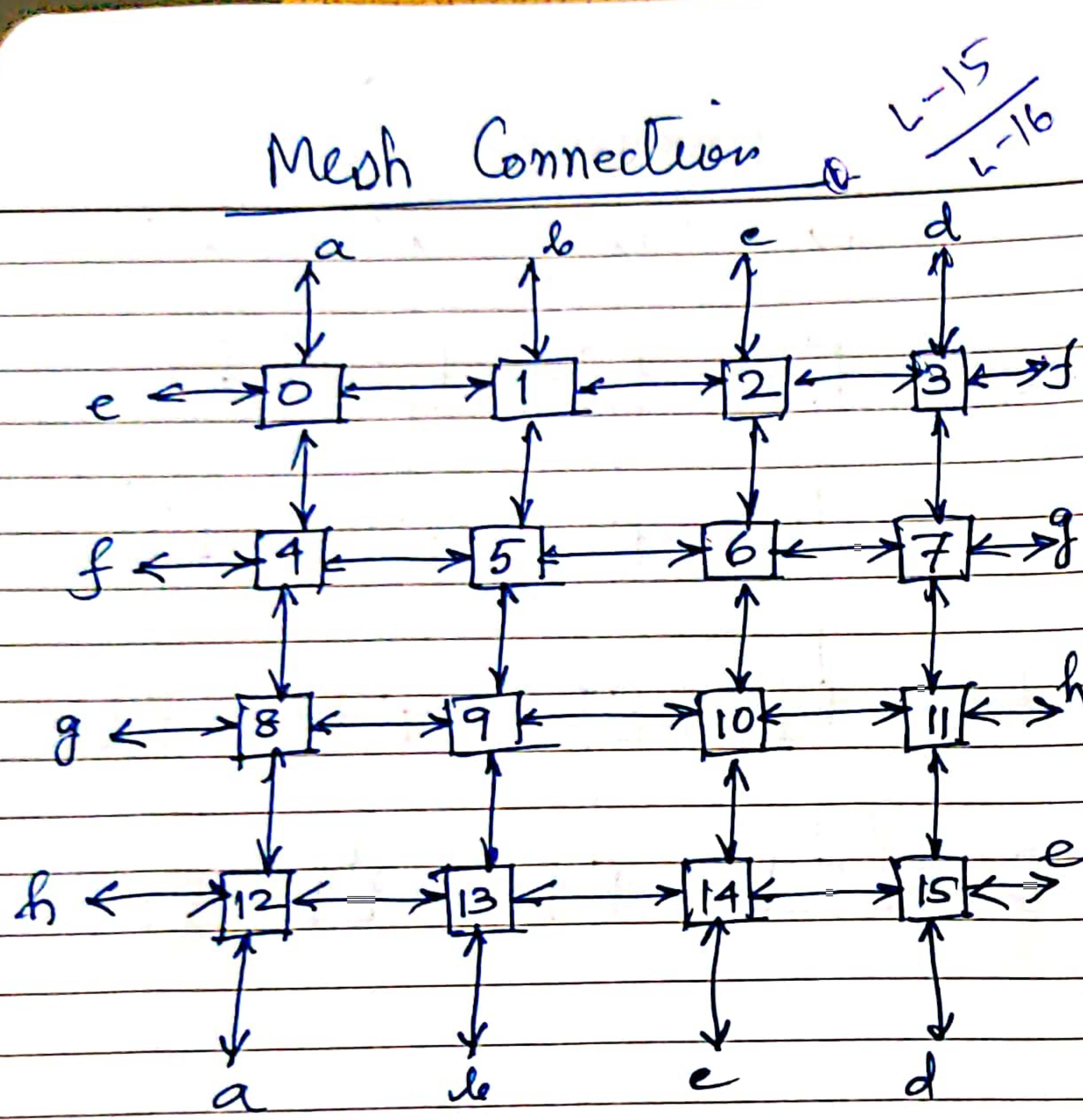
Partially Connected Network

The mesh redrewn

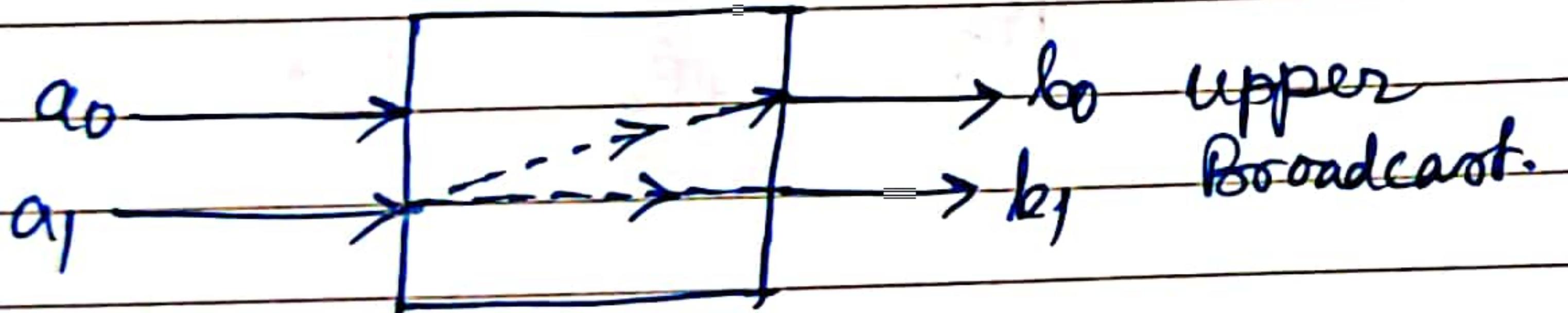
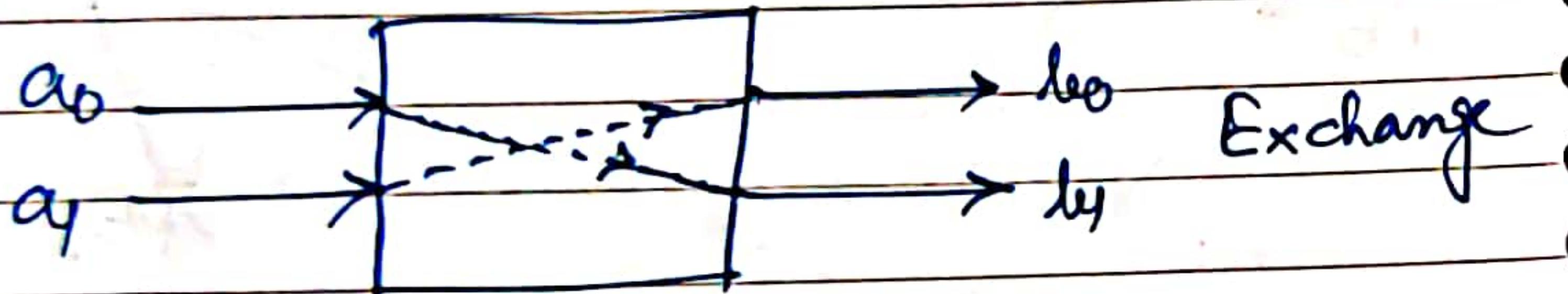
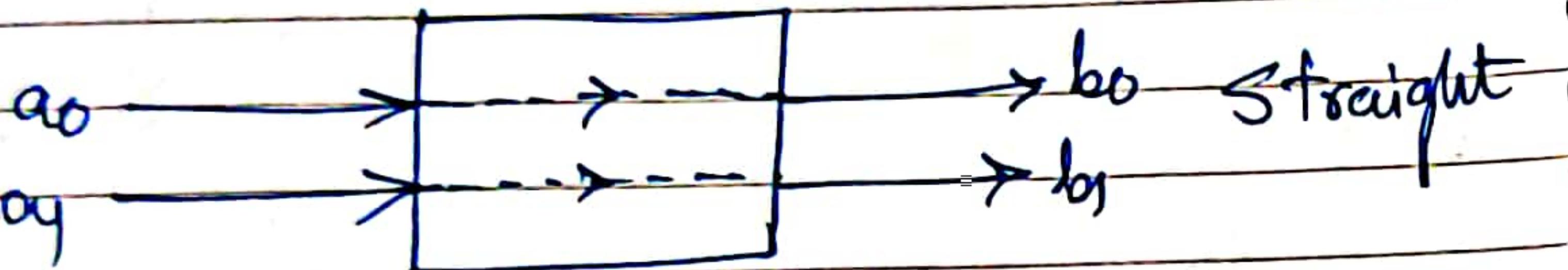
L-15
L-16



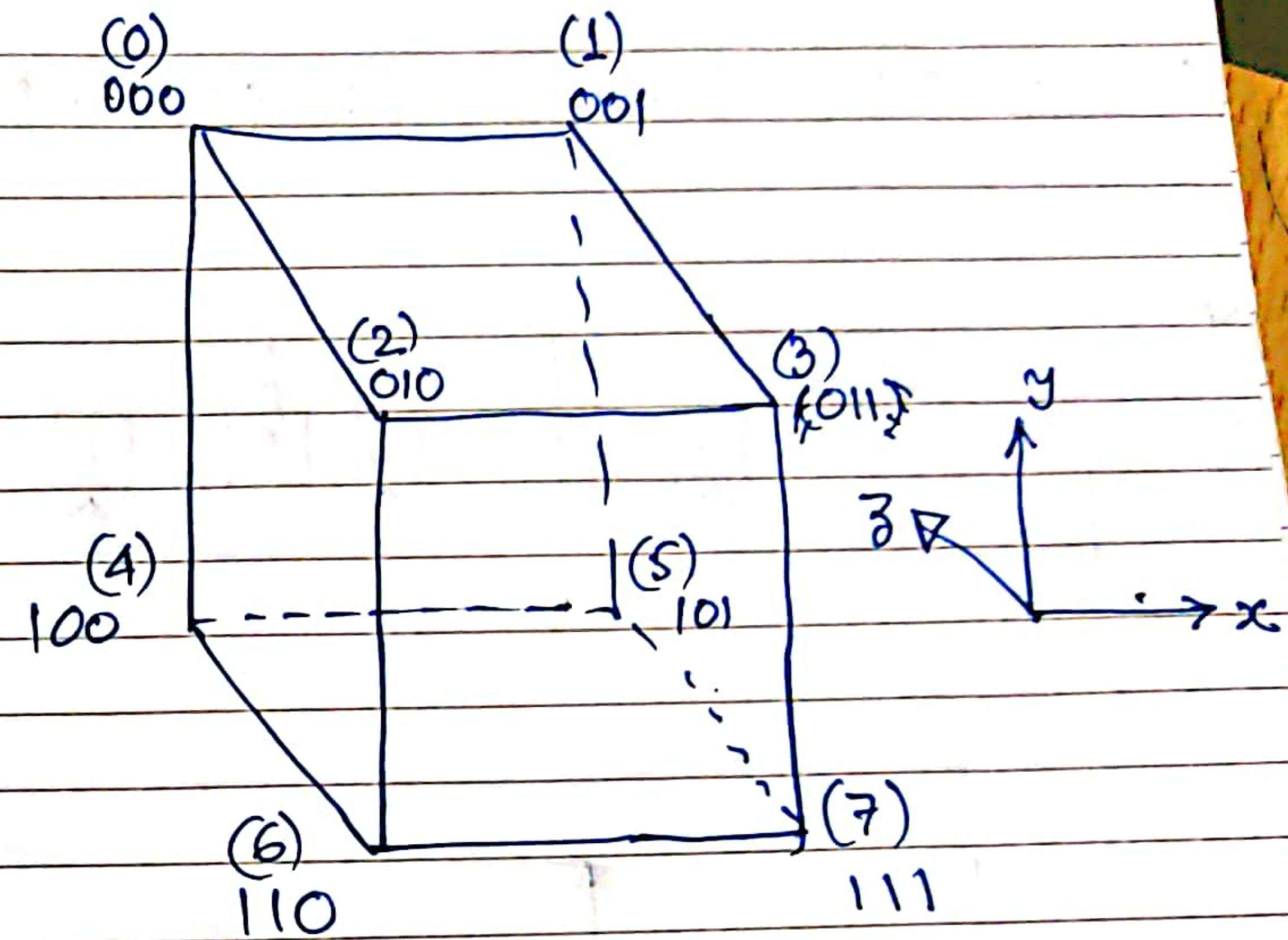
Illiac Network with $N=16$ PEs



A 2×2 switching box and its 4 interconnection states

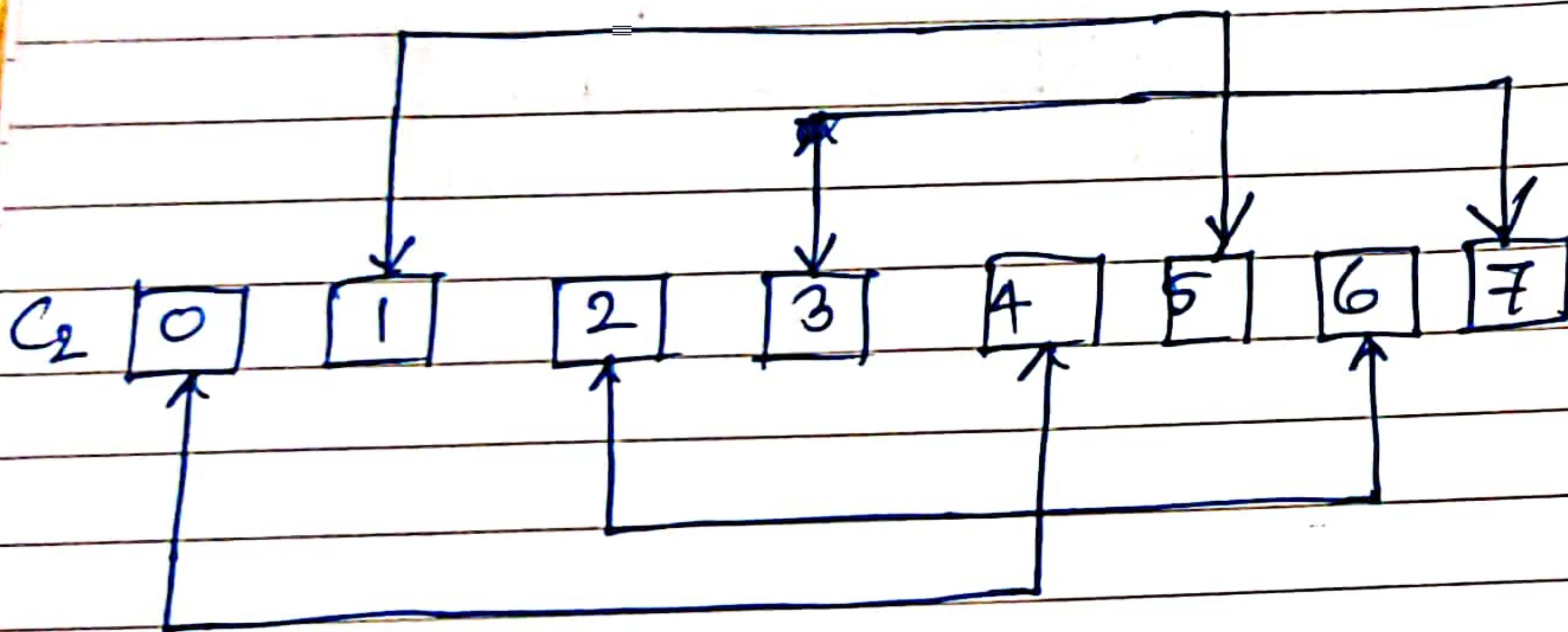
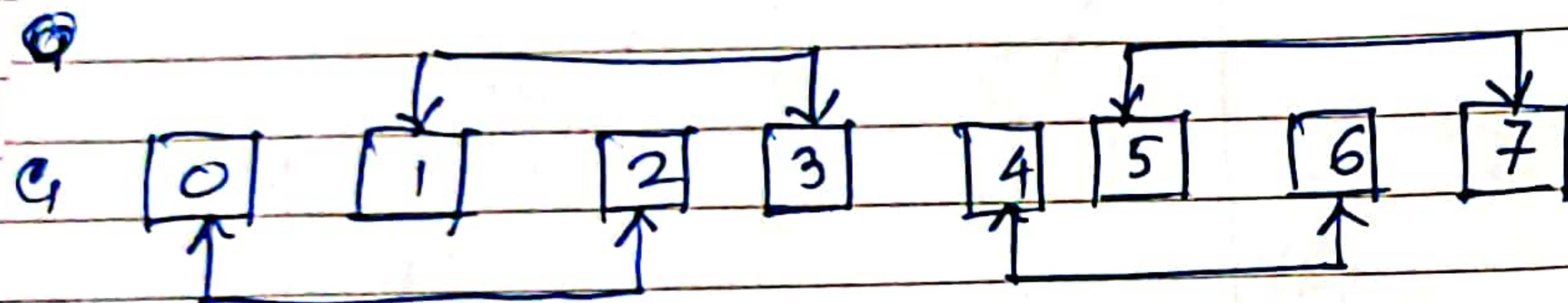
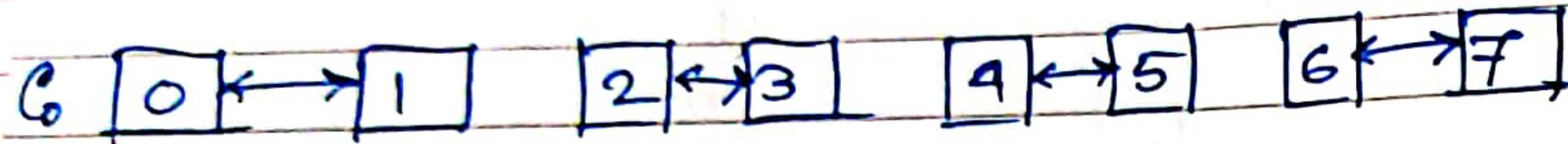


A 3-cube of 8 nodes

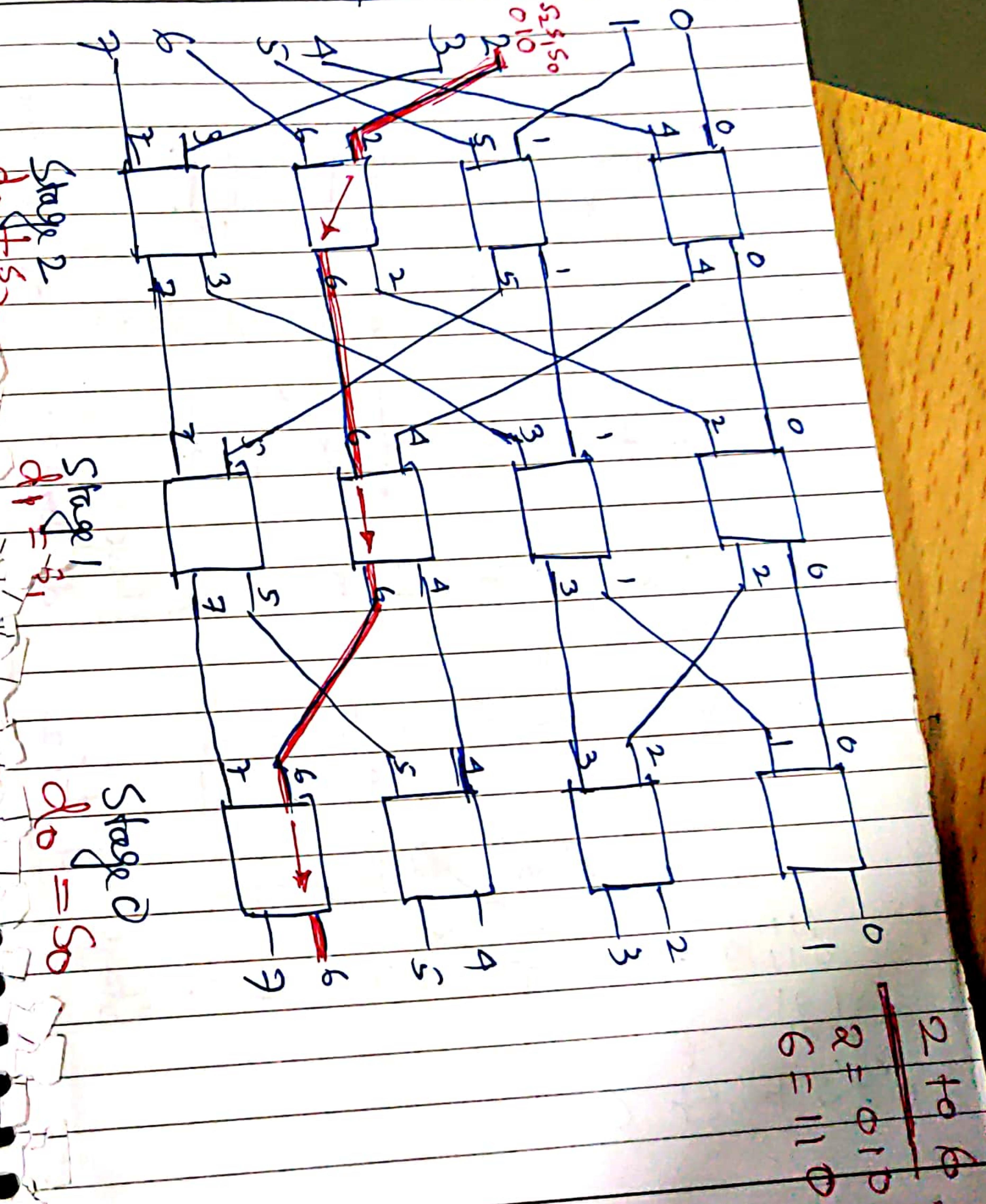


The recirculating Cyclic network

V^{-1b}
Network



A multistage Cyclic network
for $N=8$



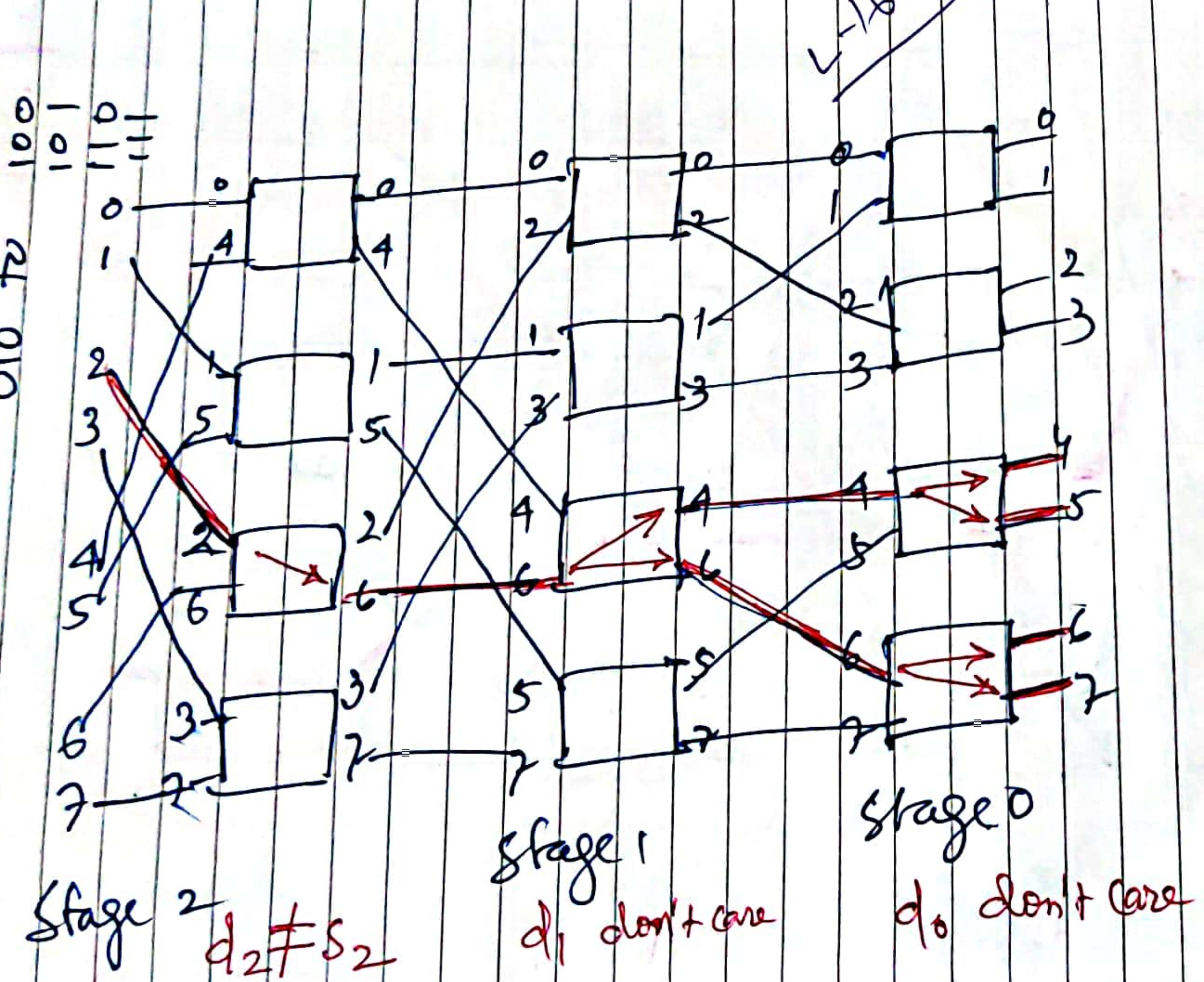
$2 = 0 \oplus 1$
 $6 = 1 \oplus 0$

Broadcasting by 9 multistage cube.

2 to 4, 5, 6, 7

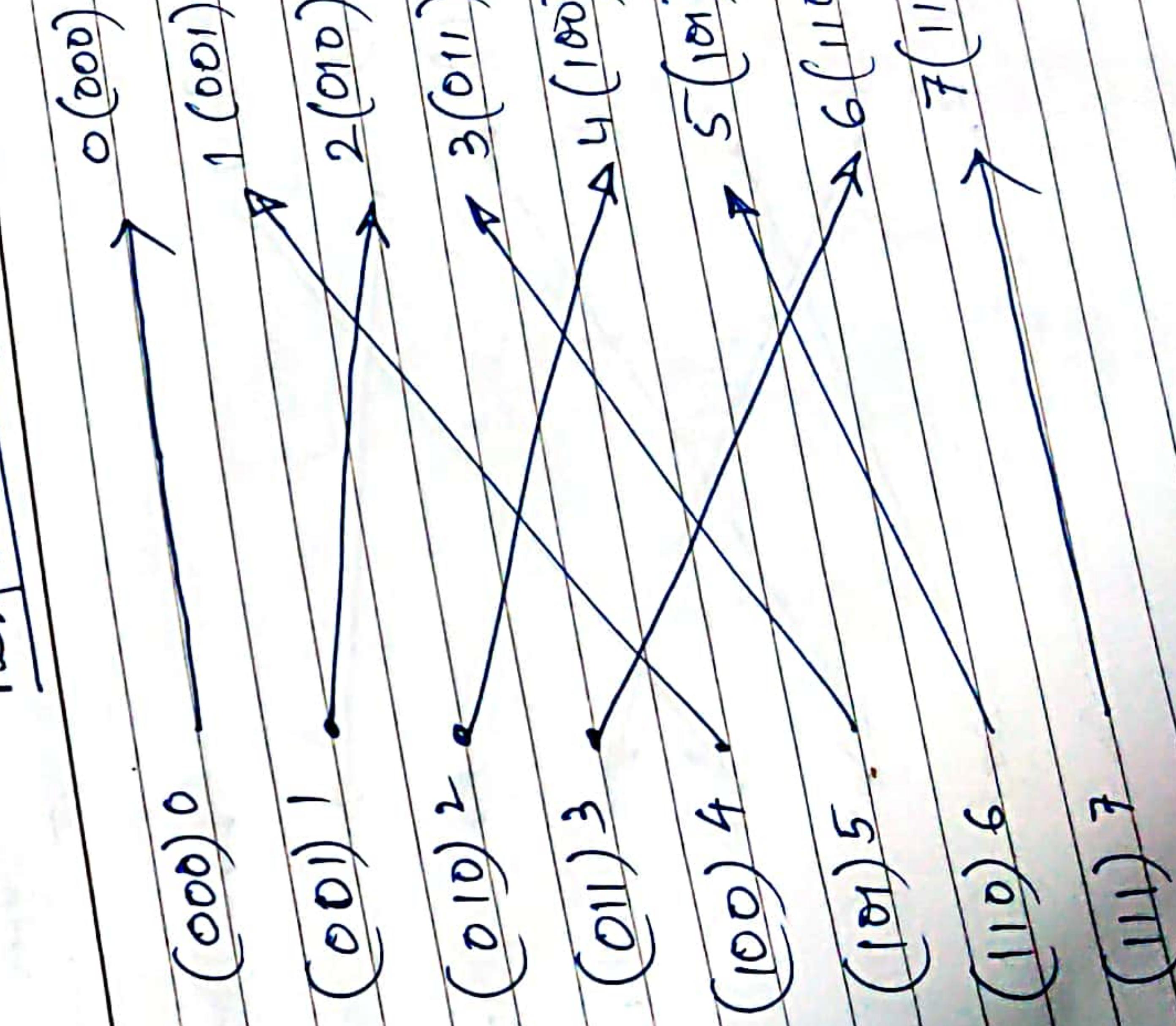
010 to 100

101 011

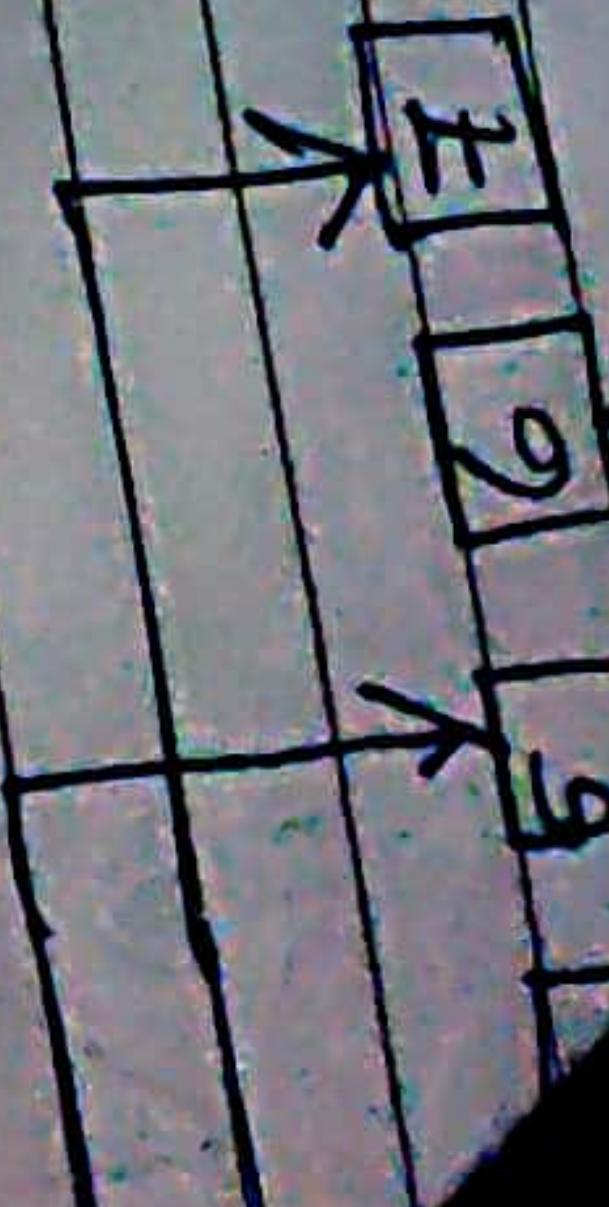


index
neighbor

Perfect Shuffle

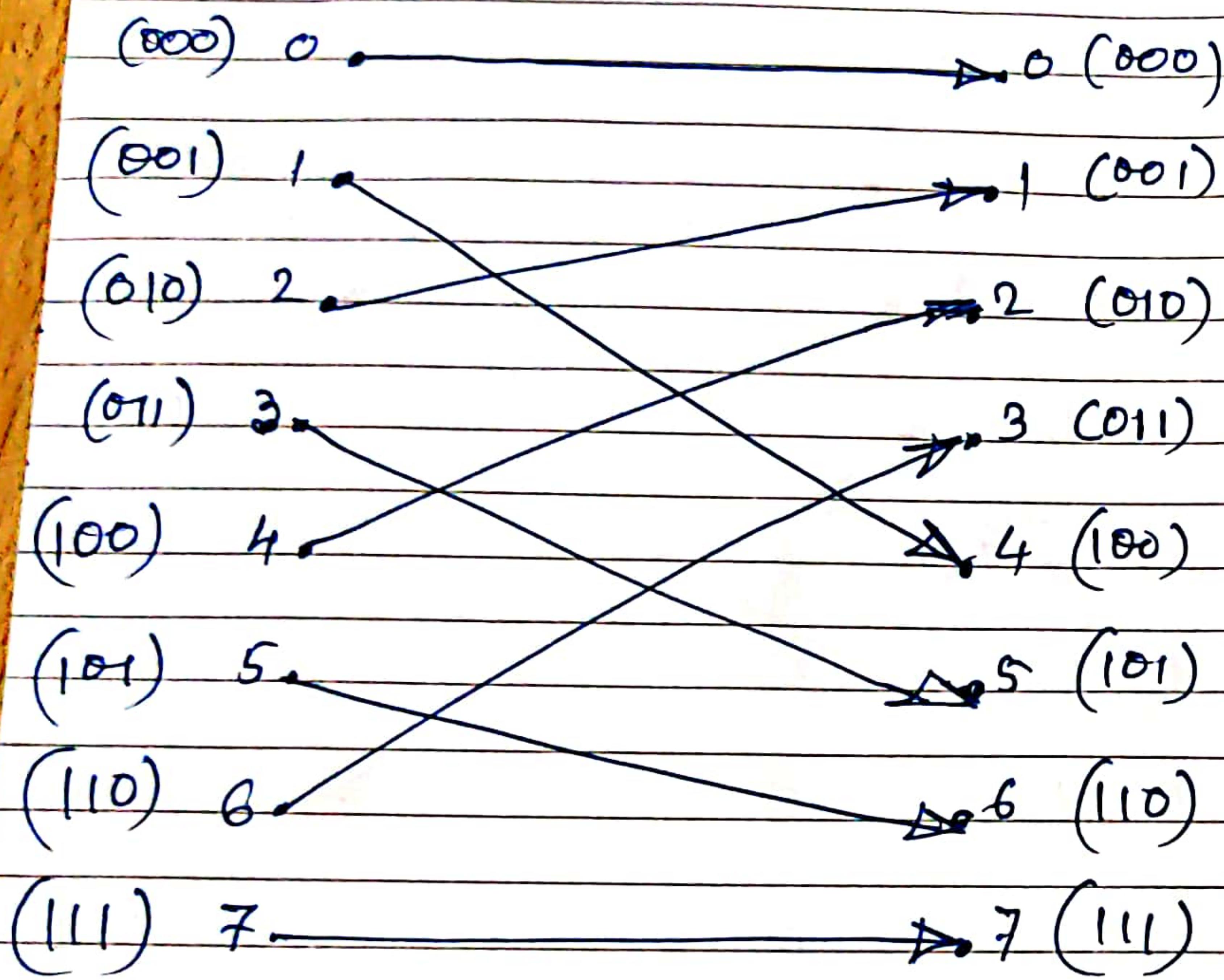


✓ IT



Inverse Perfect Shuffle

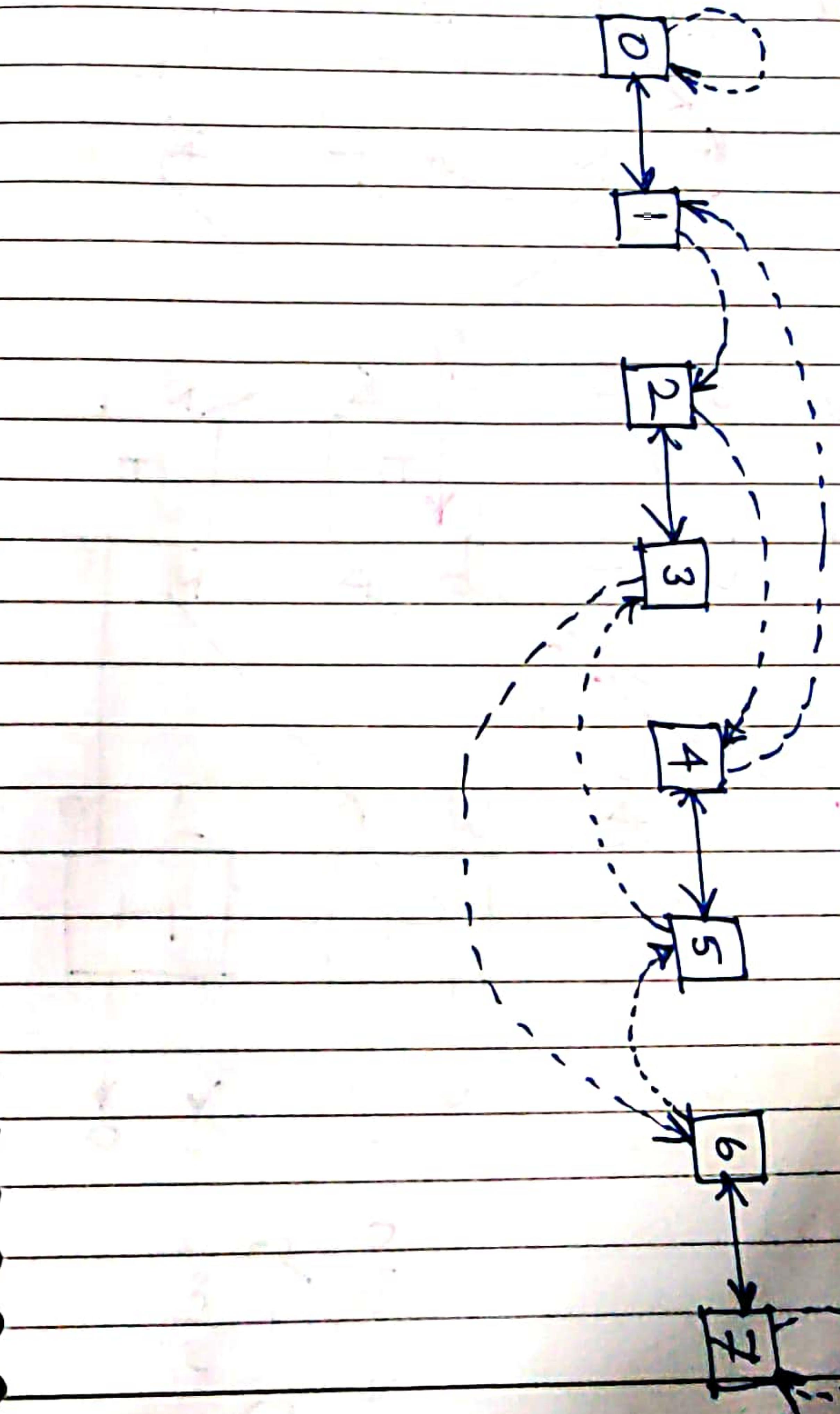
L-17
L-18



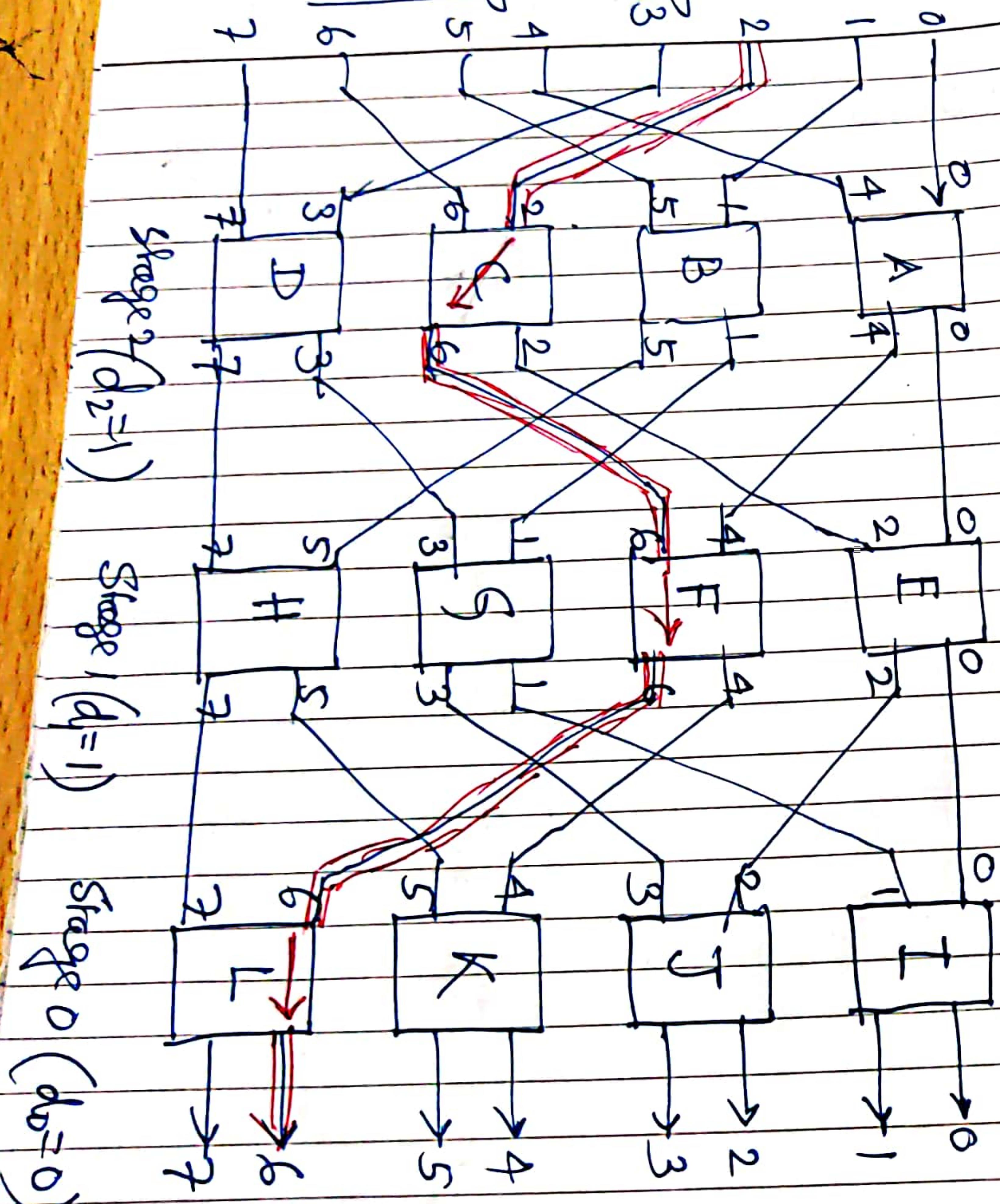
Single-stage Recirculating Shuffle-exchange network

(Solid lines: Exchange)
(Dashed lines: Shuffle)

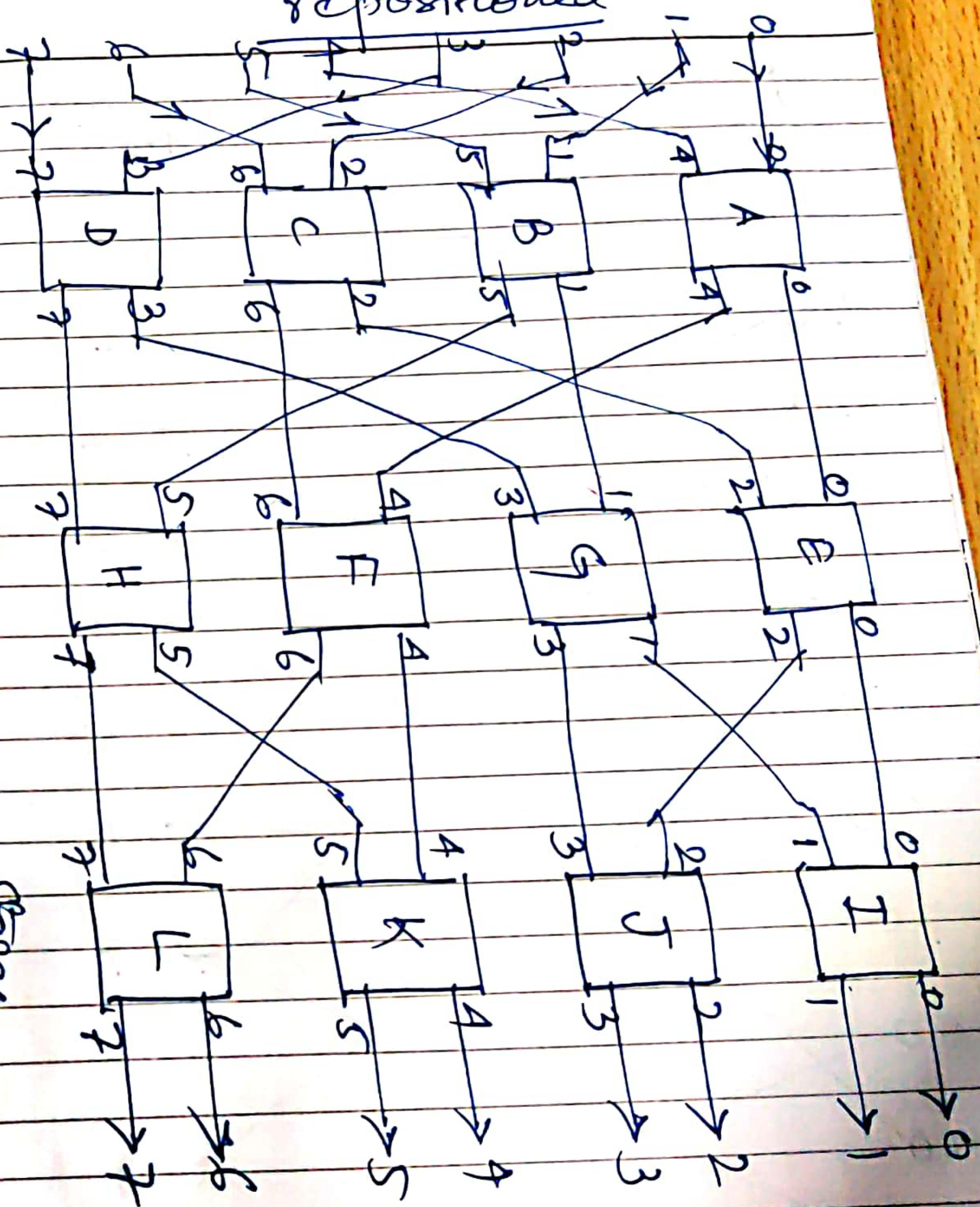
L-17



Multistage Omega Network



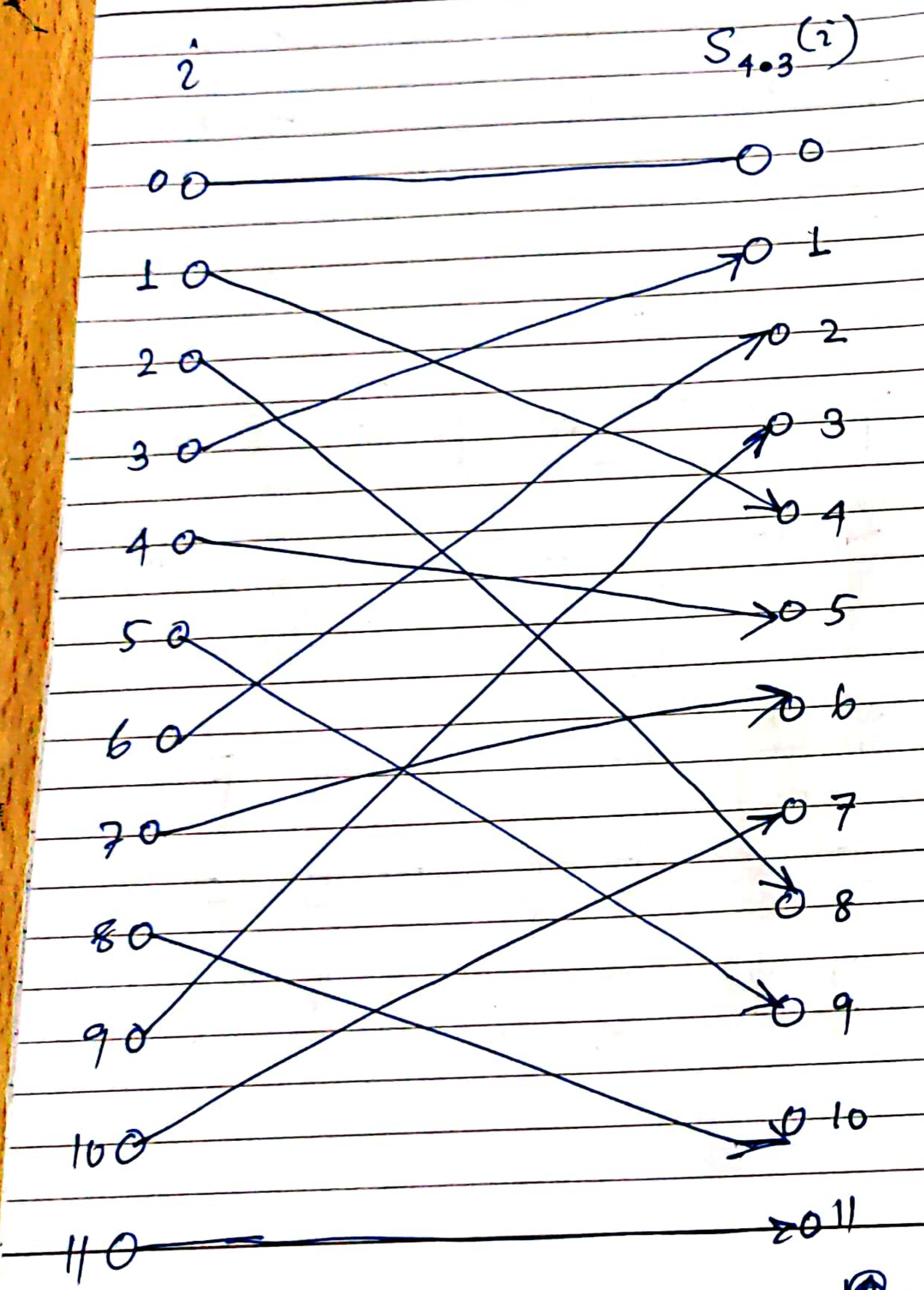
Omega Network with Switch box repositioned



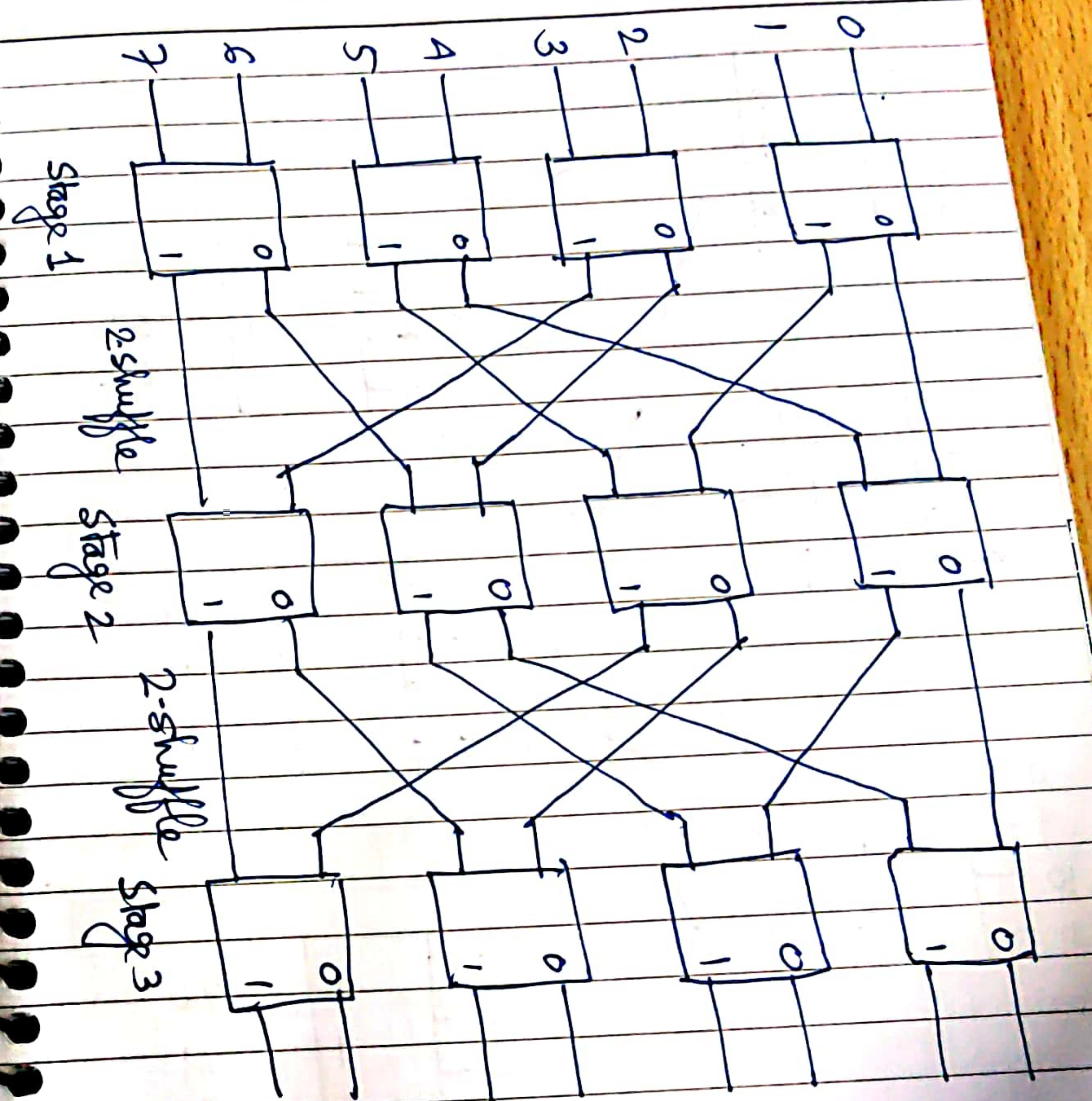
Path
2 → 6
010 → 110

ANSWER

4 shuffle of 12 objects

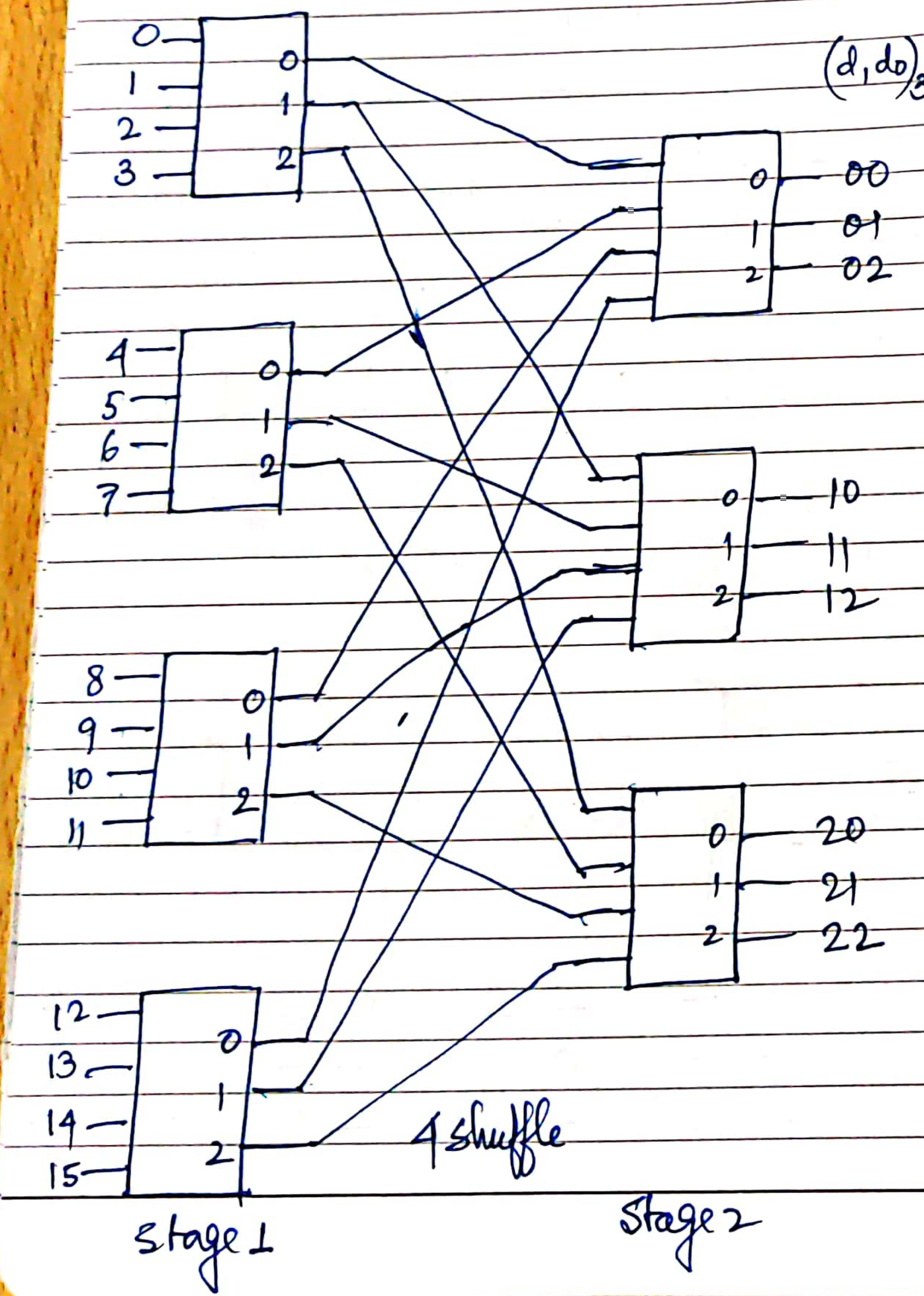


$2^3 \times 2^3$ Delta Network



$$\begin{pmatrix} d_2 & d_1 & d_0 \\ d_2 & d_1 & d_0 \end{pmatrix}_2$$

$4^2 \times 3^2$ Delta Network



$a^n \times b^m$ Delta Network

