CS & IT ENGINEERING

Discrete Maths
Graph Theory

Lecture No. 13

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TOPICS TO BE COVERED

01 Planarity

02 Eulers Formula

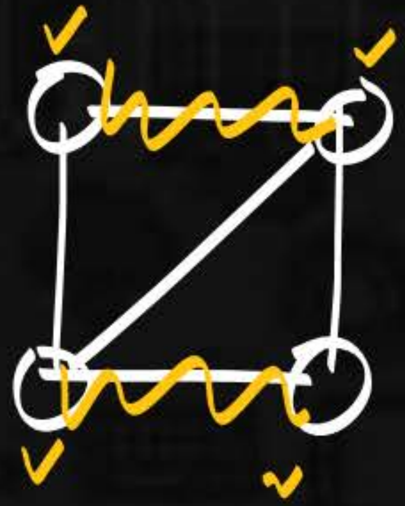
03 planarity inequality thm

04 region

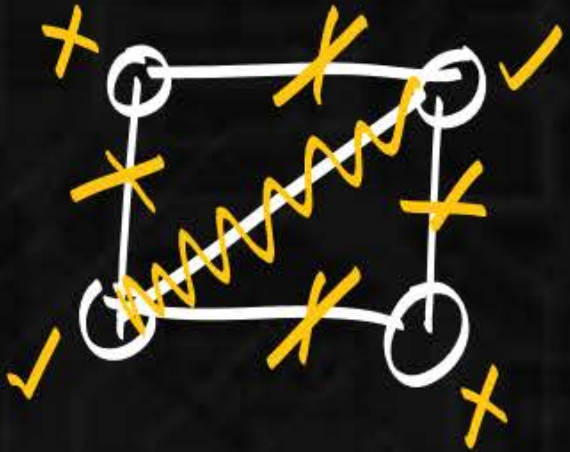
05 Practice

Graph Theory

Perfect match → maximal matching set.

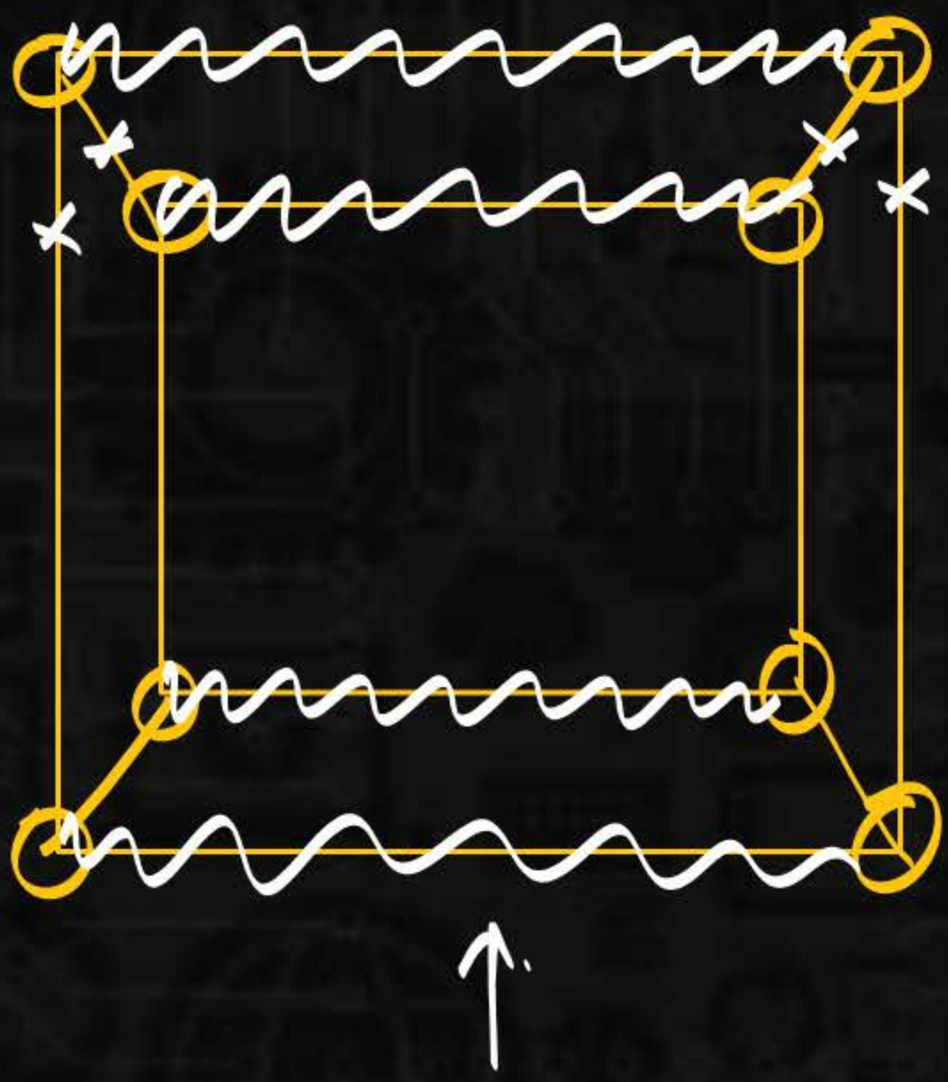


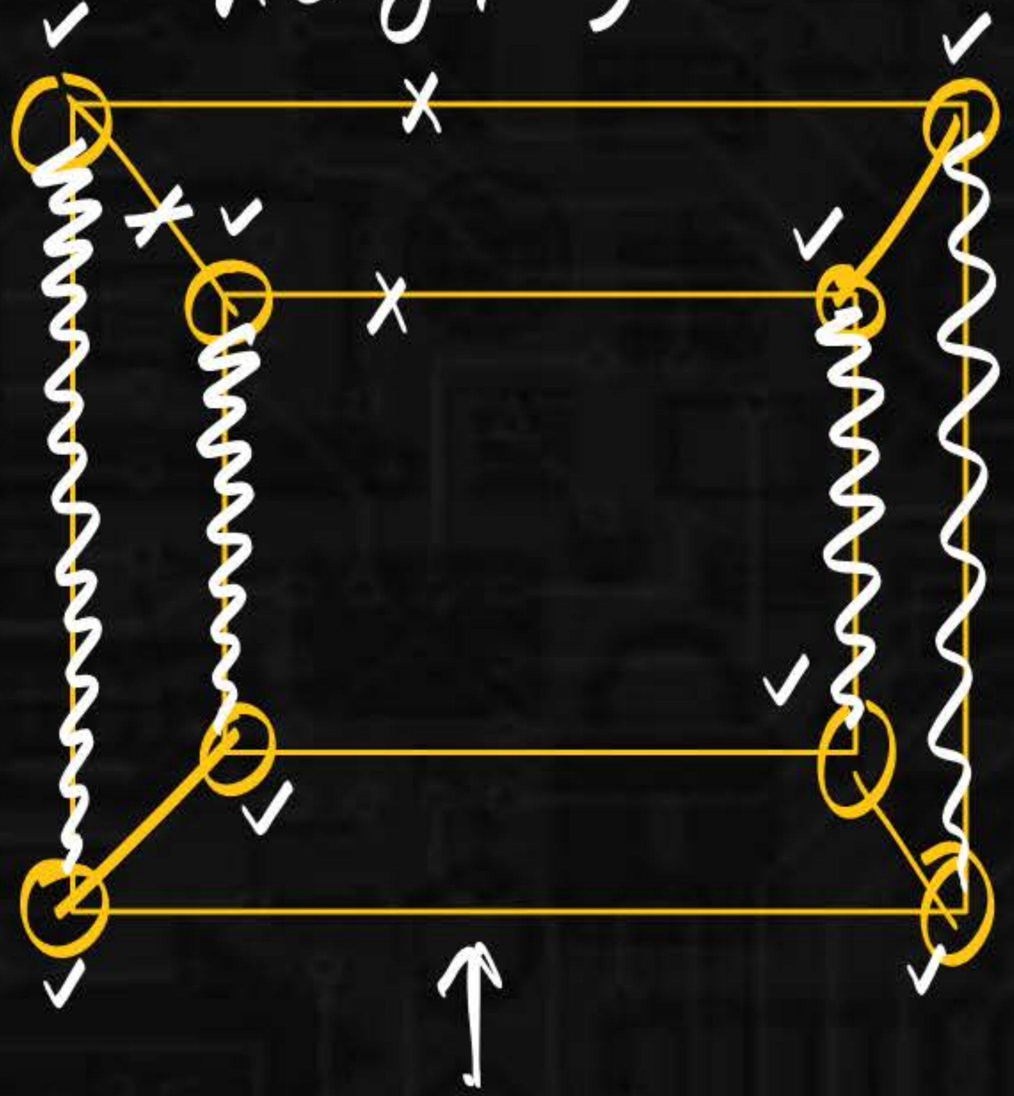
maximal matching set ↛ Perfect matching.

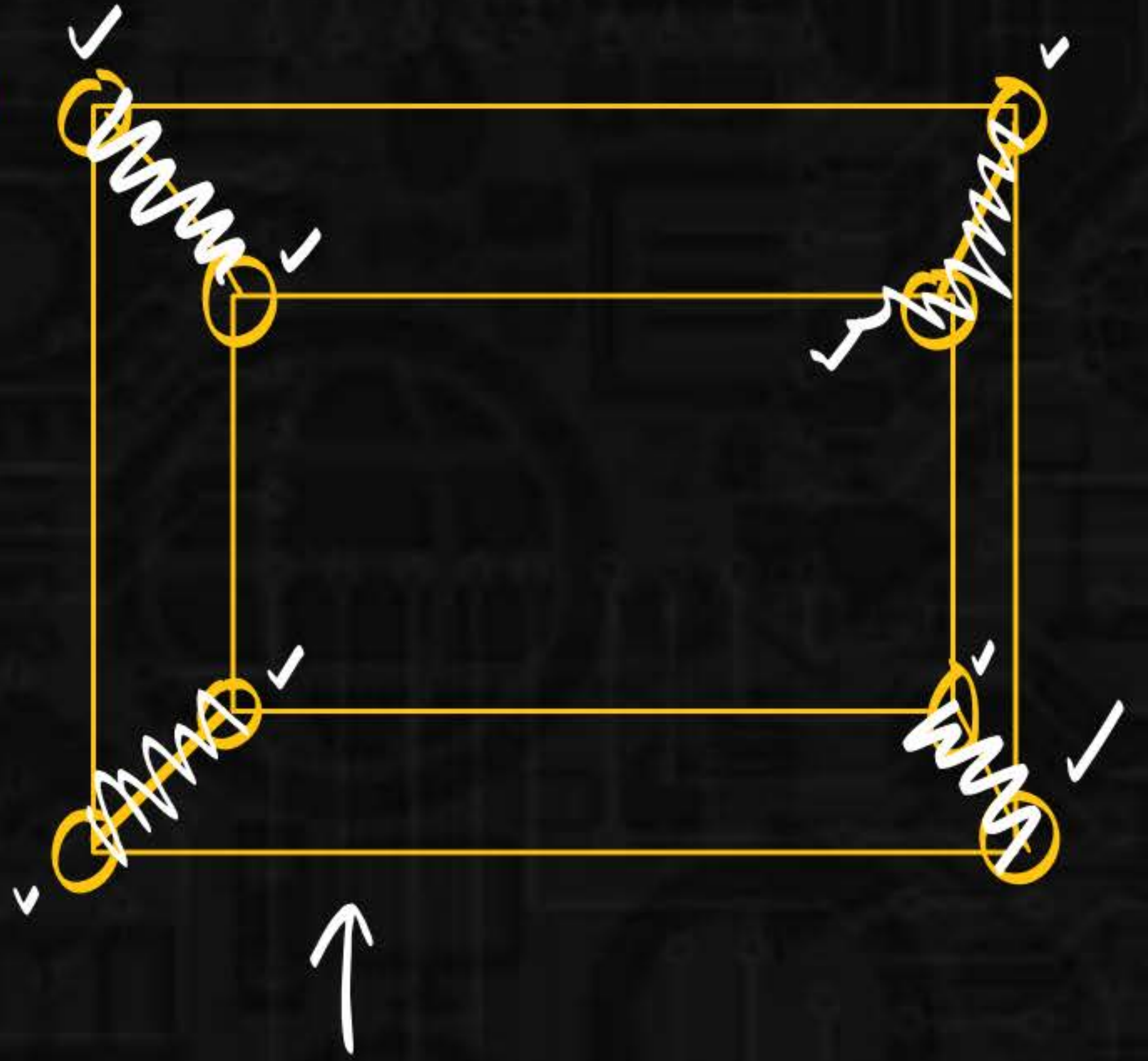


Graph Theory

no. of perfect matching = 3.

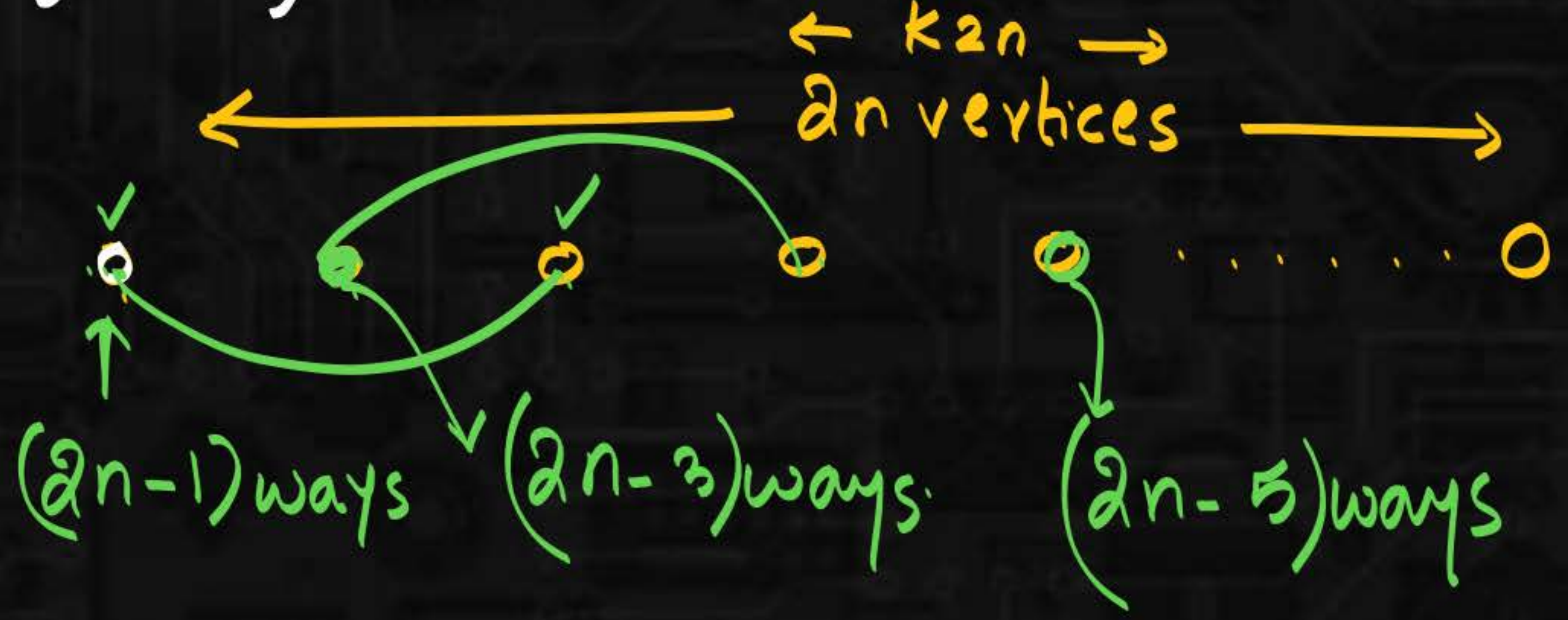






Graph Theory

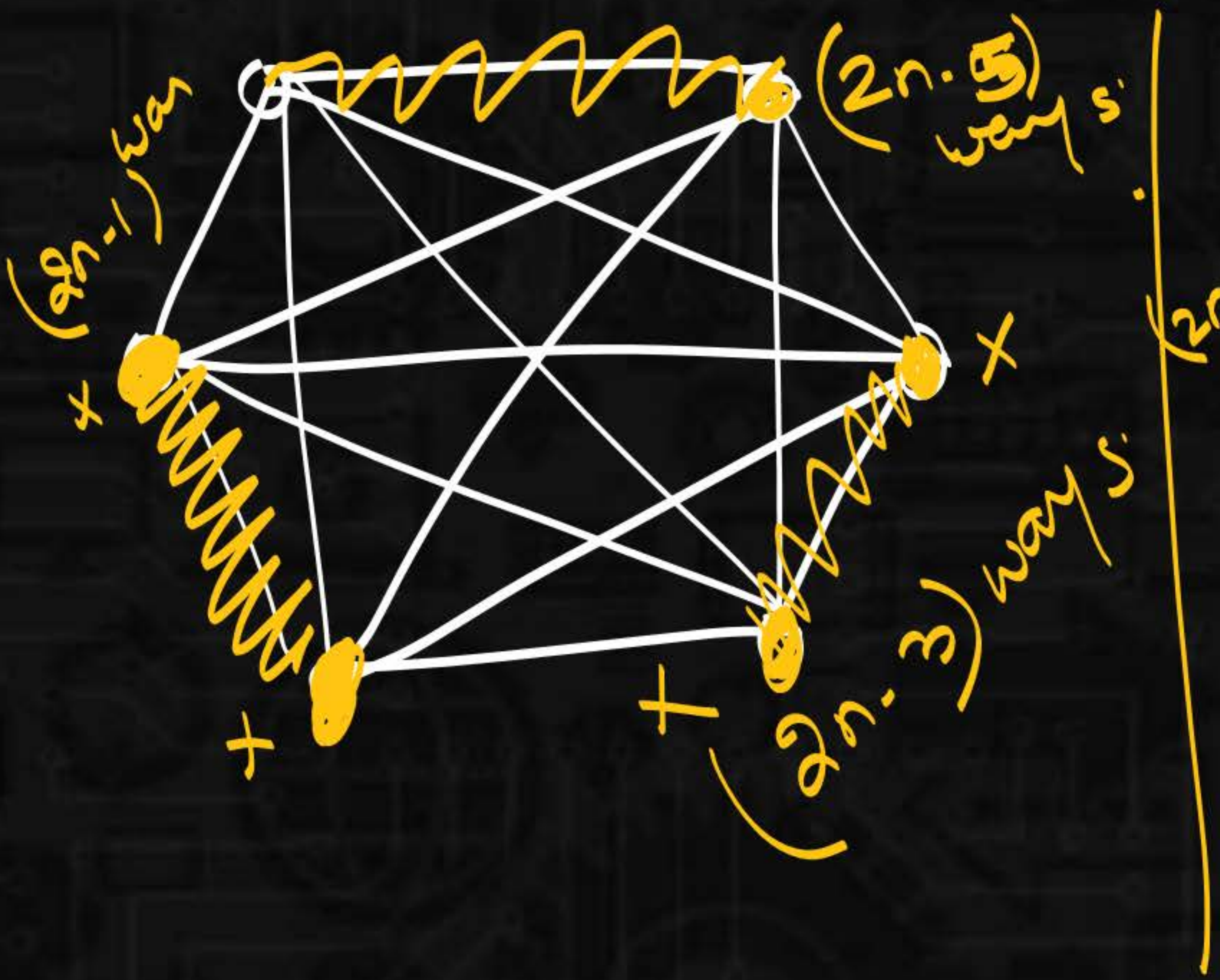
no. of perfect matching in K_{2n}.   Total vertices = $2n$.



Graph Theory

K6.

2n vertices



2n vertices.

Total perfect matching

$$= (2n-1) \times (2n-3) \times (2n-5) \cdots$$

$$= \frac{2n}{2n}(2n-1)\frac{2n-2}{2n-2}(2n-3)\frac{2n-4}{2n-4}(2n-5)\cdots$$

$$= \frac{(2n)(2n-1)(2n-2)(2n-3)(2n-4)(2n-5)}{2n \cdot (2n-2)(2n-4)} = \frac{(2n)!}{2^n \cdot n!}$$

Graph Theory

$(2n) \times (2n-2) \times (2n-4) \ldots\ldots$

take 2 common.

$2 \times n \times 2(n-1) \times 2 \times (n-2) \ldots\ldots$

$2 \cdot 2 \cdot 2 \ldots\ldots (n)(n-1) \times (n-2) \ldots\ldots$

$2^n \cdot n!$

$$\frac{(2n)!}{2n \cdot (2n-2)(2n-4) \ldots\ldots}$$

$$= \frac{(2n)!}{2^n \, n!}$$

Graph Theory

GATE: what will be P.M in complete Graph of 6 vertices.

$2n = 6$

$n = 3$

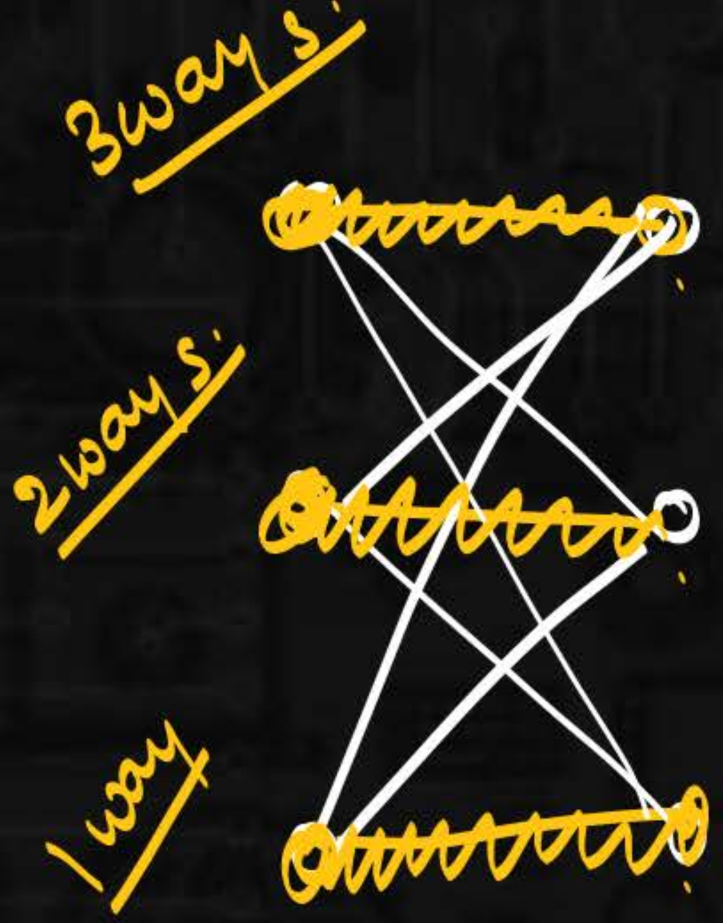
$$\left\{ \frac{(2n)!}{2^n \cdot n!} \right.$$

(ANS: 15)

$K_{n,n}$ $(n \geq 1)$

Graph Theory

$K_{3,3}$



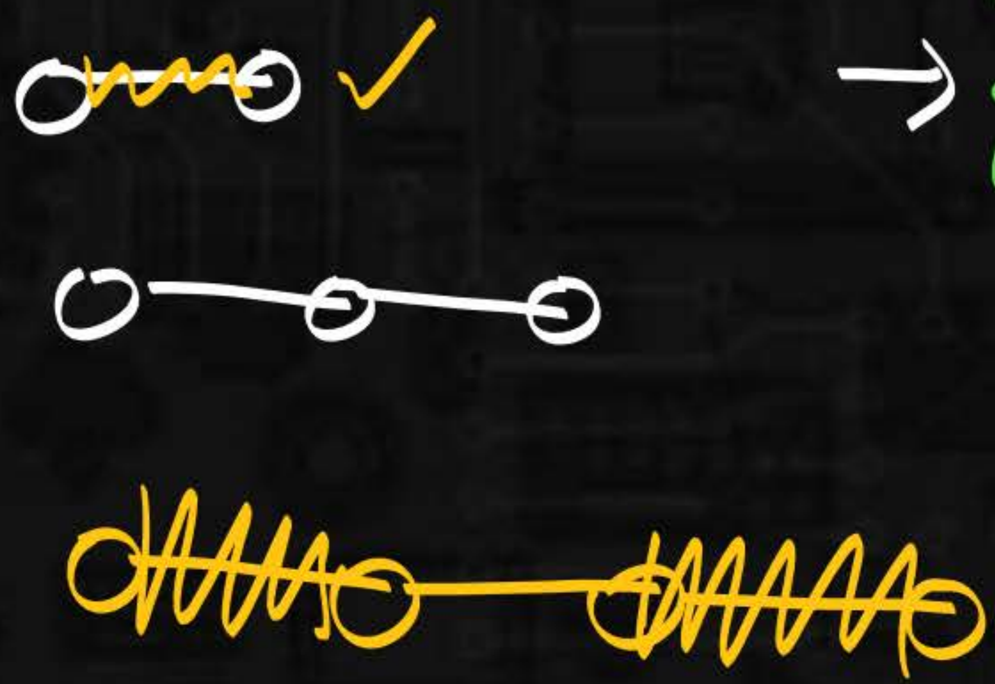
$n \cdot n-1 \cdot (n-2) \cdot \ldots$

$= n!$

$K_{n,n} \rightarrow n!$

Graph Theory

Tree:



{ if { pm exist in Tree, it will be unique.

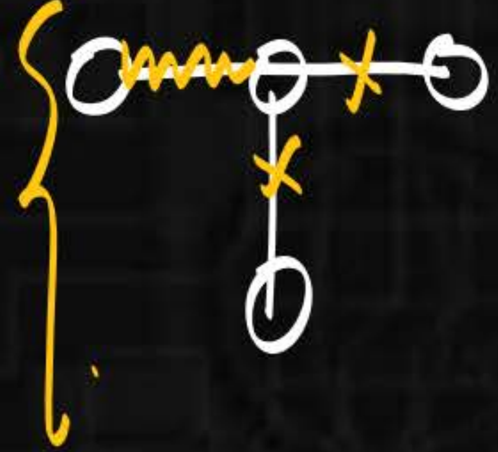
→ { Total p.m in Tree atmost 1.

Graph Theory

if p.m exist in Tree it will be unique.

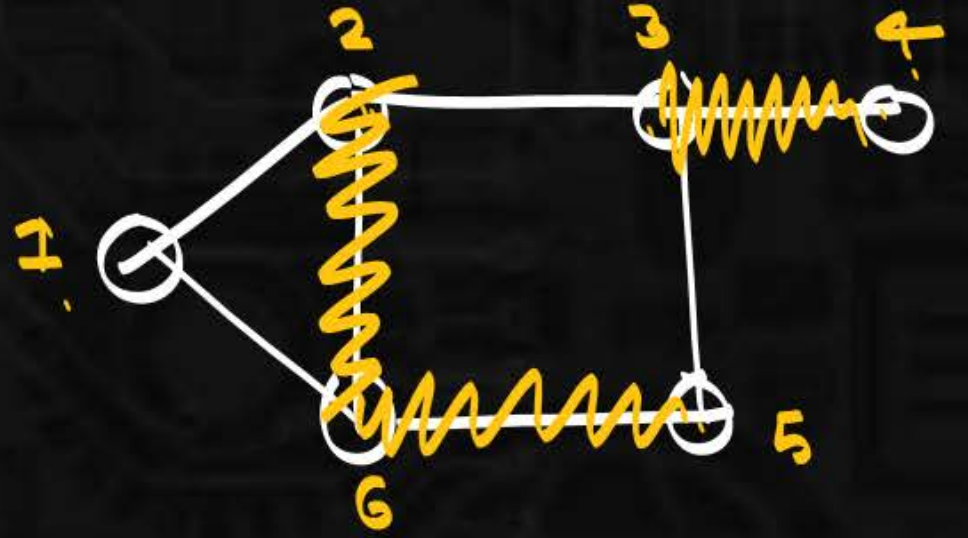
p.m doesnot exist in all Tree eg : 

but somehow if it exist then it will have only representation there is no other representation So that is why it is unique.



Graph Theory

Covering set : (atleast 1 vertices marriage proposal)
edge

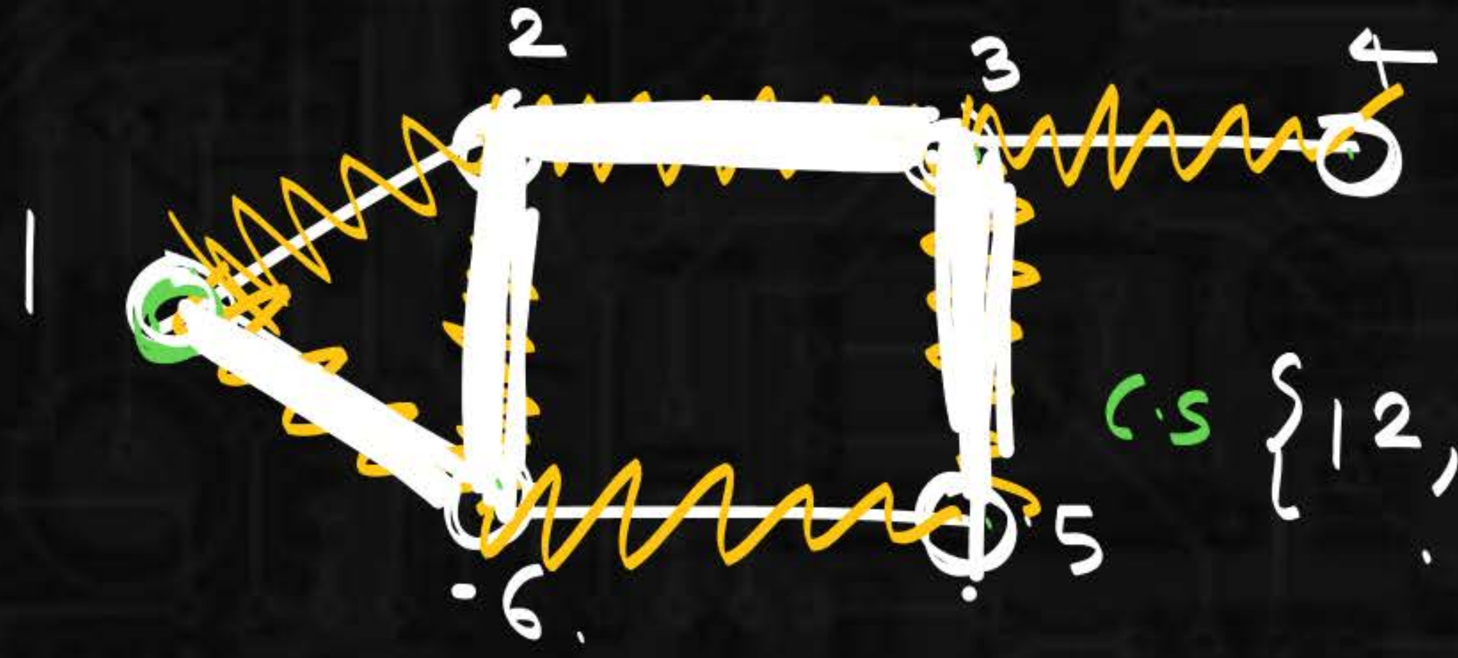


→ set of edges, such that all vertices must incident on atleast 1 edge.

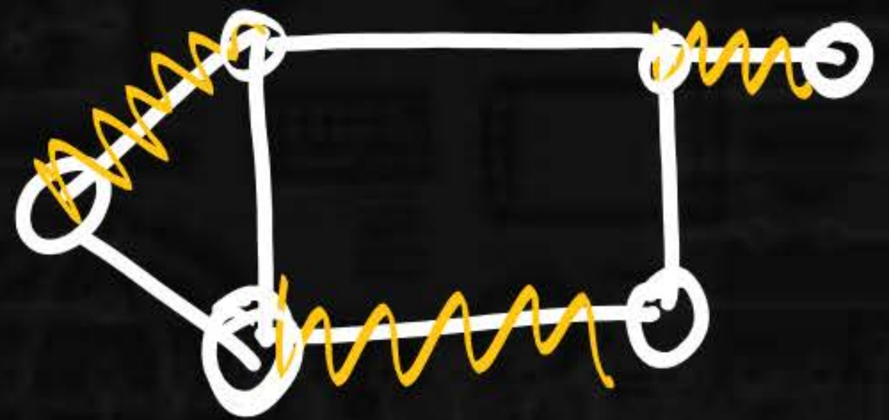
* Covering vertex set : Set of vertices, such that all edges, must incident on atleast 1 vertex

Graph Theory

→ all edges → covering set



C.S $\{12, 16, 65, 23, \cancel{35}, 34, 26\}$



C.S. $\{12, \cancel{16}, 65, \cancel{23}, 34, \cancel{26}\}$

C.S. $\{12, 65, 34\}$ → minimal covering set

Set of edges

↓

all vertices

↓ incident

atleast 1 edge.

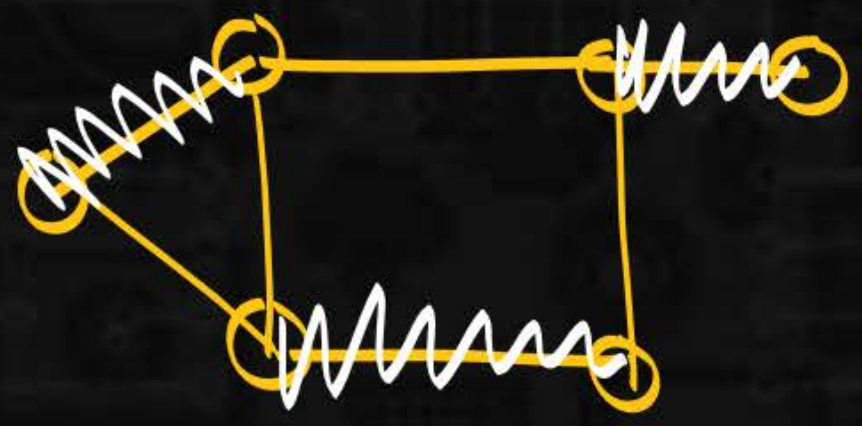
Graph Theory

<u>minimal covering set</u> : covering set such that we can not remove new edge from this.

<u>covering no ($c(G)$)</u> : no. of edges present in smallest minimal covering set

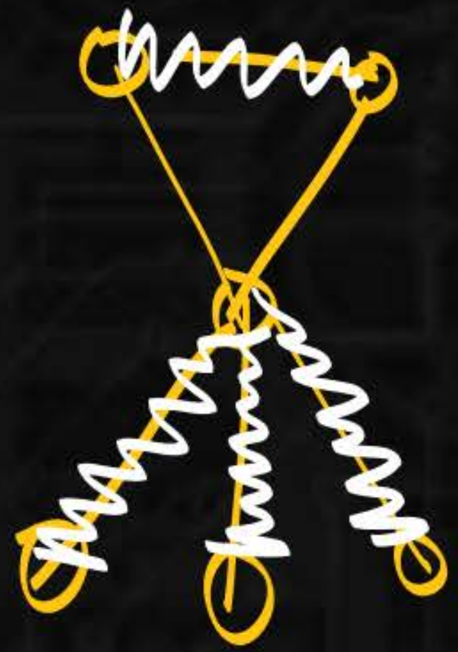
Graph Theory

Every p.m will be minimal covering set.



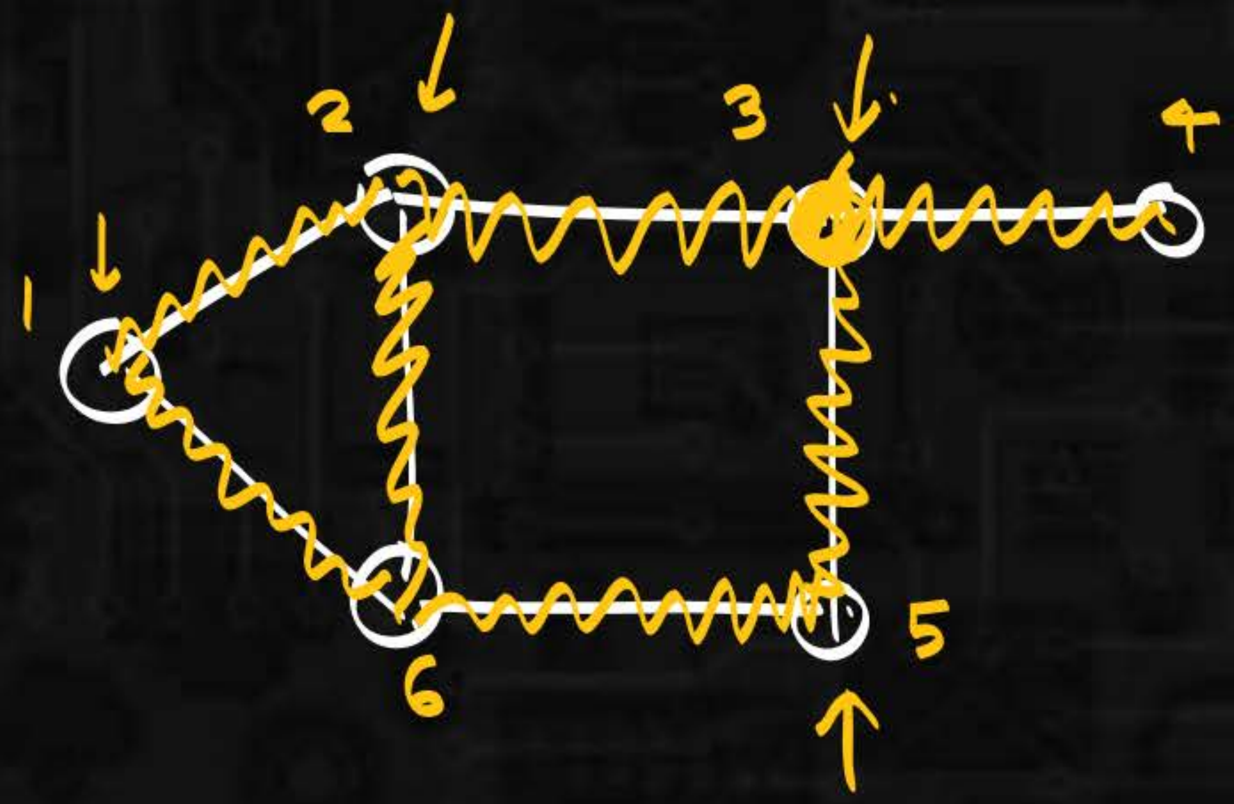
Every minimal covering set would be perfect matching.

(False)



pendant will always be included into covering.

Graph Theory



set of vertices

↓

all edges

↓

atleast 1 vertex.

Graph Theory

(policement → watching → gully)

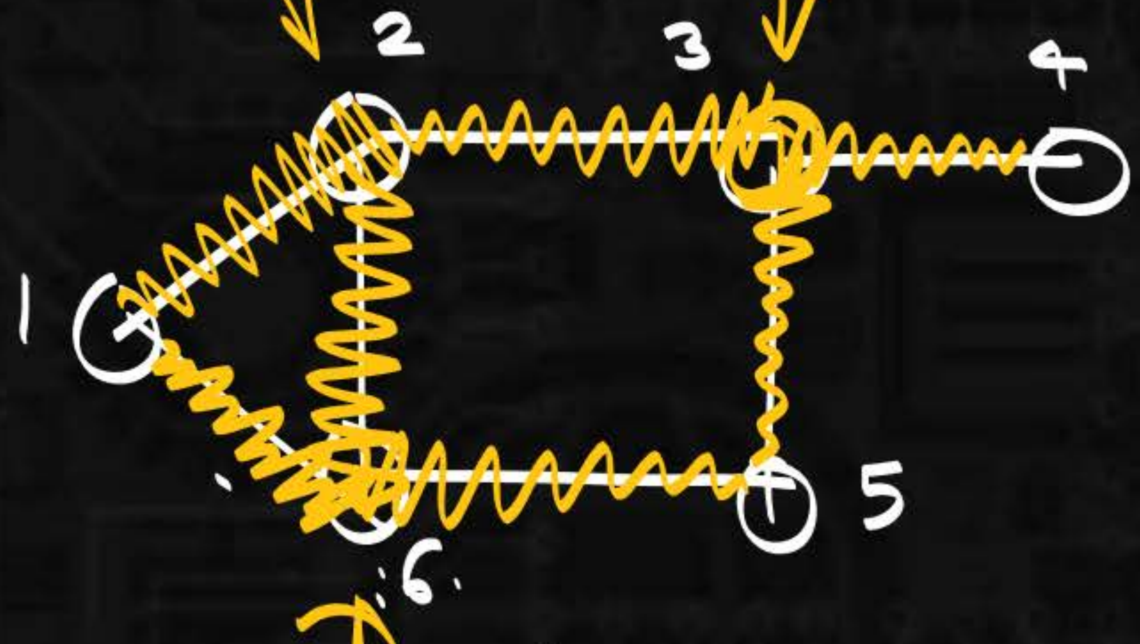
covering vertex set

Set of vertices

all edges

↓

atleast 1 vert



{2, 3, 6} → vertex covering set.


THANK YOU GW
SOLDIERS !