CombineCS
The Extra Step

3:30pm

Graph Theory

Net
Gate
M tech

COMPLETE REVISION

Daily live class at 3:30pm

Content pdf 24

Net 10

Sunday

Revision

CombineCS The Extra Step

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Rashmi Prabha

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Last date: 2nd OCT. 2021

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Pause
2concept

Q1) Let G be a complete undirected graph on 6 vertices. If vertices of G are labeled, then no. of distinct cycle of length 4 in G is equal to ...? (Gate 2012)

$\frac{n(n-1)}{2}$

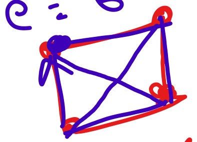
A. 15

B. 30

C. 90

D. 360

$= \frac{6 \times 5}{2} = 15$



Q1) Let G be a complete undirected graph on 6 vertices. If vertices of G are labeled, then no. of distinct cycle of length 4 in G is equal to …? (Gate 2012)

A. 15

B. 30

C. 90

D. 360

Complete Graph

No. of edges = n(n-1)/2

Distinct cycle length = (n-1)!

15*3! = 90

Q2)What is the chromatic number of n vertex simple connected graph which does not contain any odd length cycle. Assume n>=2.

a) N
b) N-1
c) 2
d) 3

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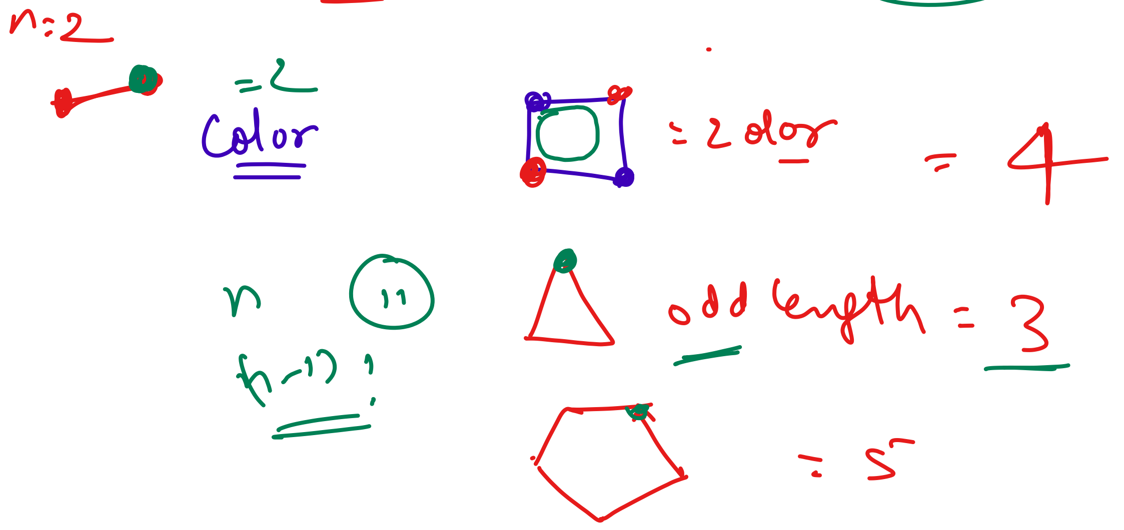

Applicative Ques

Q3) Simple non-directed graph G has 24 edges & degree of each vertex is K, then which is possible no. of vertices.

a) 20
b) 15
c) 10
d) 8

Q3) Simple non-directed graph G has 24 edges & degree of each vertex is K, then which is possible no. of vertices.

a) 20

b) 15

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Repetitive 2018, 2019, 2020

Q4) G is undirected graph with n vertices & 25 edges such that each vertex has degree at least 3, then max possible value of n is..?

a) 16

b) 17

Q4) G is undirected graph with n vertices & 25 edges such that each vertex has degree at least 3, then max possible value of n is..?

a) 16

b) 17

3, 4, 5 ...

$\sum deg(v) = 2e$

$3n \le 2 \times 25$

$n = \frac{2 \times 25}{3} = \frac{50}{3} = 16$

Q5) Minimum no. of vertices possible in a simple graph if 41 edges such that each vertex has degree at most 5?

at most 0, 1, 2, 3, 4, 5

$5|V| \leq 41 \times 2$

$|V| \leq \frac{41 \times 2}{5}$

max ≤ 16

a) 16

b) 17

Q5) Minimum no. of vertices possible in a simple graph if 41 edges such that each vertex has degree at most 5?

handshaking

a) 16

b) 17

Tree

- Has exactly one path btw any two vertices
- not contain cycle
- connected
- No. of edges = n -1

Graph Theory

1. No. of edges in a complete graph = n(n-1)/2
2. Bipartite Graph : There is no edges between any two vertices of same partition .
3. In complete bipartite graph no. of edges = m*n
4. Bipartite graph is 2 colorable.
5. Handshaking theorem - Sum of degree of all vertices is equal to twice the number of edges.
6. Maximum no. of connected components in graph with n vertices = n
7. Minimum no. of connected components

   0 (null graph) , 1 (not null graph)

8. Minimum no. of edges to have connected graph with n vertices = n-1
9. To guarantee that a graph with n vertices is connected, minimum no. of edges required = {(n-1)*(n-2)/2 } + 1
10. Euler Graph = if it there exists atmost 2 vertices of odd – degree.
11. For complete graph the no . of spanning tree possible = n^{n-2}

Handshaking Theorem states in any given graph,

- **Sum of degree of all the vertices is twice the number of edges contained in it.**
- The sum of degree of all the vertices is always even.
- The sum of degree of all the vertices with odd degree is always even.

$$\sum_{i=1}^{n} d(v_i) = 2 \times |E|$$

Handshaking Theorem

For Simple connected Planar graph

- A graph is planar if and only if it does not contain a subdivision of K_5 and $K_{3,3}$ as a subgraph.
- Let G be a connected planar graph, and let n, m and f denote, respectively, the numbers of vertices, edges, and faces in a plane drawing of G. Then $n - m + f = 2$.
- Let G be a connected planar simple graph with n vertices and m edges, and no triangles. Then $m \leq 2n - 4$.
- Let G be a connected planar simple graph with n vertices, where $n = 3$ and m edges. Then $m \leq 3n - 6$.

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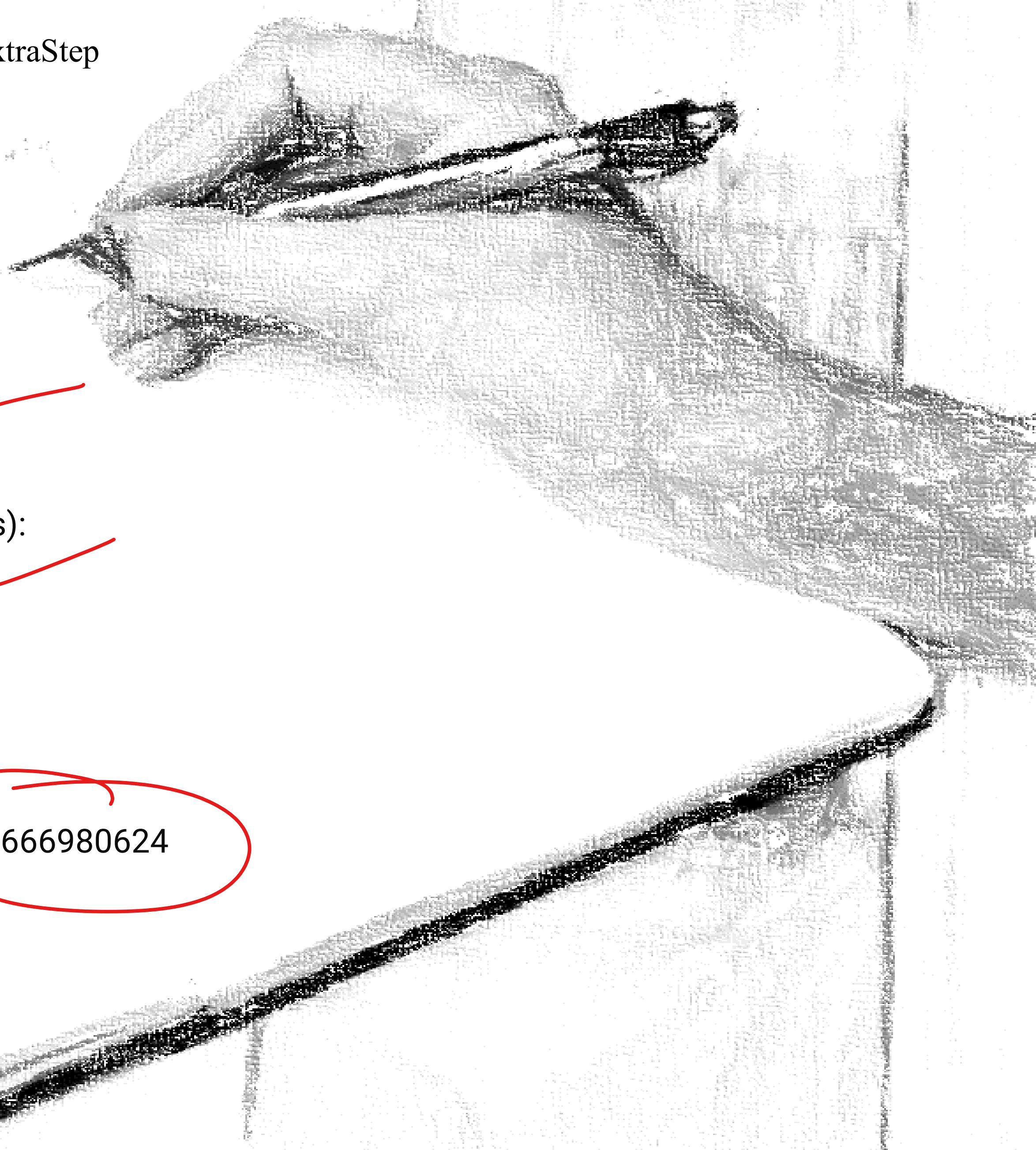

Thank you

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