CS & IT ENGINEERING

Graph Theory

DPP 02

Discussion Notes

[MCQ]

1. Which of the following is a graphic sequence?

(a) 5, 3, 3, 2, 2, 1 → graphical.

(b) 2, 1, 1, 1, 1, 1

(c) 6, 5, 4, 3, 2, 1

(d) 5, 5, 2, 2, 1, 1

b) 2 1 1 1 1 1

not graphical

d) 5 5 2 2 1 1

n = 6

n-1, n-1 1

not graphical

c) 6 5 4 3 2 1

not possible

a) 5 3 3 2 2 1

2 1 1 0

1 0 1 0

1 1 0 0

[NAT]

2. Find the number of edges of an undirected graph having degree sequence 2, 4, 4, 3, 4, 1?

$$\sum d(v_i) = 2e$$

$$2 + 4 + 4 + 3 + 4 + 1 = 2e$$

$$2 + 8 + 8 = 2e$$

$$18 = 2e$$

$$e = 9$$

Ans : 9

[NAT]

3. Let δ denote the minimum degree of any vertices of a given graph and let Δ denote the maximum degree of any vertex in the graph. Suppose a certain graph has 8 vertices and that $\delta = 4$ and $\Delta = 6$, then this graph must contains at least 16 edges.

$n = 8 \quad \delta(G) = 4 \quad \Delta(G) = 6$

$\delta(G) \leq \frac{2e}{n} \leq \Delta(G)$

$16 \leq e$

$2 \times 8 \leq 2e$

$\frac{2 \times 8}{2} \leq e$

[NAT]

4. There are 24 routers in Physics Wallah. Find the number of cable required to connect them such that each router is connected with exactly 6 others.

$$\frac{24}{2} \times 6 = \frac{2e}{2}$$

$$e = 72$$

Ans : 72.

[MCQ]

5. What is the maximum value of minimum degree (δ) with a graph of order 10 and size 16?

(a) 4
(b) 3 ✓
(c) 2
(d) 1

$n = 10 \quad e = 16.$

$$\delta(G) \leq \frac{2e}{n}$$

$$\delta(G) \leq \frac{2 \times 16}{10}$$

$$\delta(G) \leq 3.2$$

$(0\ 1\ 2\ 3) \leq 3.2$

$0 \leq 3.2$
$1 \leq 3.2$
$2 \leq 3.2$
$3 \leq 3.2$

[NAT]

1. Consider a complete graph with size 2016. Suppose after deletion of 2 vertices from the above graph, the modified graph have x number of edges and y number of vertices. Find the value of x – y ?

$e = 2016$.

$\frac{n(n-1)}{2} = 2016$.

$n(n-1) = 2016 \times 2$.

$n(n-1) = 4032$

$64 \times 63 = 4032$

$n = 64$. modified $n = 62$.

K_{62}

$e = \frac{n(n-1)}{2}$.

$= \frac{62 \times 61}{2}$

$(30+1)(60+1)$.

$x \rightarrow$ edges.

$y \rightarrow$ vertices.

$y = 62$

$x = 1891$; 2

$y = 62$

1829

[MSQ]

2. Which of the following options is/are True?

(a) Some k–regular graph can be complete graph. (T)

(b) A graph with more than 2 vertices, it must have at least 2 vertices with same degree. (T)

(c) The degree sum of odd degree vertices must be even. (T)

(d) The degree sum of odd degree vertices must be odd. (F)

(a, b, c)

[MCQ]

3. Consider a wheel graph (w_n) with $n \geq 4$. Which of the following is minimum number of edges added to the above wheel graph to make it complete graph?

(a) $n(n-1)$

(b) $\frac{(n^2-5n+4)}{2}$

(c) $\frac{n(n-1)}{4}$

(d) None of these.

$2(n-1) + x = \frac{n(n-1)}{2}$

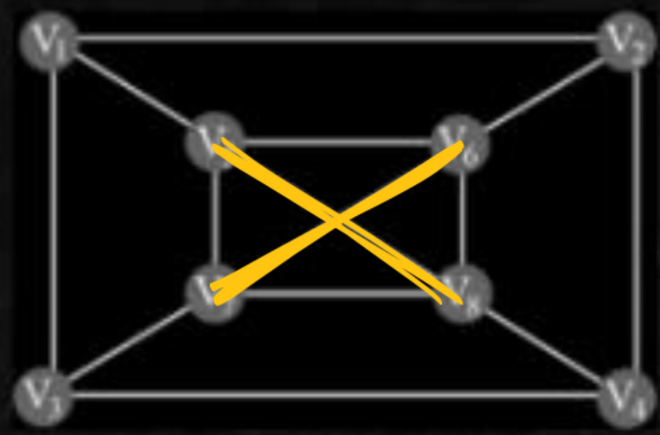
$x = \frac{n(n-1)}{2} - 2(n-1) = \frac{n^2-5n+4}{2}$

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

$\frac{n^2-n-4n+4}{2}$

[NAT

4. Consider the given graph G(V,E) with order is 8 $\{V_1, V_2, V_3, \ldots V_8\}$. Find the minimum number of edges to be deleted from the graph, such that the graph become bipartite graph 2 ?



[MSQ]

5. Which of the following options is/are correct?

(a) Every NULL graph is always bipartite graph. (F) (b,c)

(b) Some cycle graph is complete graph. (T)

(c) A cyclic graph is different from cycle graph. (T)

(d) A graph G is bipartite graph if and only if it has even cycle. (F)

[MSQ]

6. Consider a regular graph with order 6 and size 12. Which of the following is the minimum degree(δ) and maximum degree (Δ)?

(a) $\delta = 3, \Delta = 4$

(b) $\delta = 4, \Delta = 3$

(c) $\delta = 4, \Delta = 4$

(d) None of these

$n = 6 \quad e = 12$

$$\delta(G) \leq \frac{2e}{n} \leq \Delta(G)$$

$$\leq \frac{2 \times 12}{6}$$

$$\delta(G) \leq 4 \leq \Delta(G)$$


THANK YOU GW
SOLDIERS !