

CS & IT ENGINEERING

Graph Theory

DPP 01

Discussion Notes

[MCQ]

1. Which of the following is a graphic sequence?

☒ (a) 5, 3, 3, 2, 2, 1 \rightarrow graphical

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

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

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

b) $\underline{2} \quad \underline{11111}$
not graphical

d) $\underline{5} \quad \underline{5} \quad 2 \quad 2 \quad 1 \quad 1$
 $n=6$

$n-1, n-1, \dots, 1$
not graphical

c) 6 5 4 3 2 1
not possible

a) $\begin{array}{ccccccc} 5 & 3 & 3 & 2 & 2 & 1 & \\ & 2 & 2 & 1 & 1 & 0 & \\ & & 1 & 0 & 1 & 0 & \\ & & & 0 & 0 & & \\ & & & & 1 & 1 & 0 & 0 \end{array}$

[NAT]

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

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

Ans : 9.

$$2 + \underbrace{4 + 4}_{\downarrow} + \underline{3 + 4 + 1} = 2e$$

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

$$18 = 2e$$

$$e = 9$$

[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.

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

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

$$2 \times 4 \leq \frac{2e}{8}$$

$$16 \leq e$$

$$2 \times 8 \leq e$$

[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.

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

Ans : 72.

$$e = 72$$



[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

$$n=10 \quad e=16.$$

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

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

$$\delta(n) \leq \underline{\underline{3.2}}$$

$$(\underline{0 \ 1 \ 2 \ 3}) \leq 3.2$$

$$\left\{ \begin{array}{l} 0 \leq 3.2 \\ 1 \leq 3.2 \\ 2 \leq 3.2 \\ \rightarrow 3 \leq 3.2 \end{array} \right.$$

