

## Assignment - 5

① Adjacency matrix ( $A$ ):

	1	2	3	4	5	6	7	8
1	0	1	0	0	0	0	0	1
2	1	0	1	0	0	0	0	1
3	0	1	0	1	0	0	0	1
4	0	0	1	0	1	1	0	0
5	0	0	0	0	0	1	0	0
6	0	0	0	0	1	0	0	0
7	0	0	0	0	0	0	1	0
8	1	1	0	0	0	0	1	0

No. of non-zero entries = 22

sum of all entries = 22.

② from the given graph

$$A = \{B, C, E\}$$

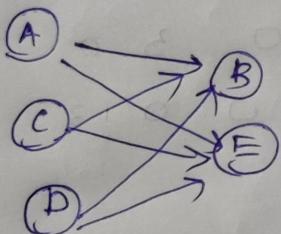
$$B = \{A, C, D, E\} \quad E = \{A, B, C, D\}$$

$$C = \{A, B, E\}$$

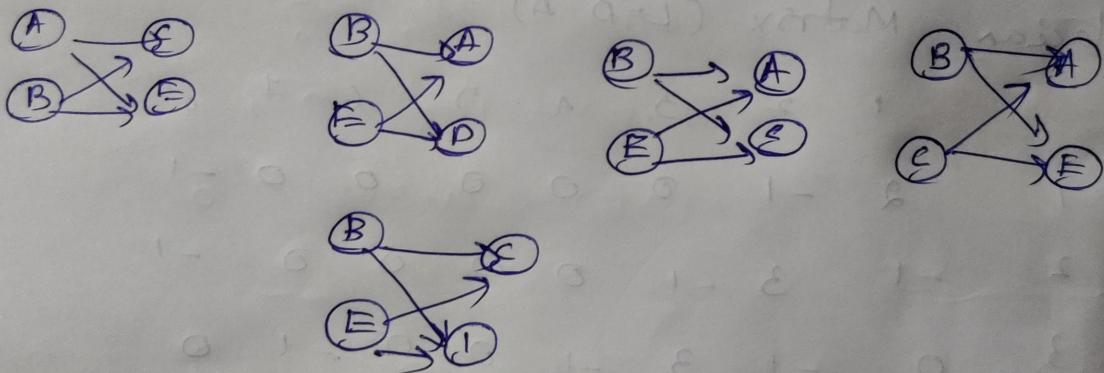
$$D = \{B, E\}$$

so, B and E have support more than 3

∴ Bipartite subgraph of  $K_{3,2}$



- Bipartite subgraph of  $K_{2,2}$



③ (a)  $P_a = \frac{\text{No. of edges in the network}}{\text{Total possible no. of edges}}$

$$= \frac{7}{50} = \frac{7}{10} = 0.1$$

(b)  $P_b = \frac{\text{No. of edges in the network}}{\text{Total possible no. of edges}}$

④ Degree matrix (D):

$$\begin{matrix} & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 1 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 2 & 0 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3 & 0 & 0 & 3 & 0 & 0 & 0 & 0 & 0 \\ 4 & 0 & 0 & 0 & 3 & 0 & 0 & 0 & 0 \\ 5 & 0 & 0 & 0 & 0 & 2 & 0 & 0 & 0 \\ 6 & 0 & 0 & 0 & 0 & 0 & 3 & 0 & 0 \\ 7 & 0 & 0 & 0 & 0 & 0 & 0 & 3 & 0 \\ 8 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3 \end{matrix}$$

No. of non-zero entries = 8

sum of all entries = 8

Laplacian Matrix ( $L = D - A$ )

$$\begin{matrix} & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 1 & 2 & -1 & 0 & 0 & 0 & 0 & 0 & -1 \\ 2 & -1 & 3 & -1 & 0 & 0 & 0 & 0 & -1 \\ 3 & 0 & -1 & 3 & -1 & 0 & 0 & -1 & 0 \\ 4 & 0 & 0 & -1 & 3 & -1 & -1 & 0 & 0 \\ 5 & 0 & 0 & 0 & 0 & 2 & -1 & 0 & 0 \\ 6 & 0 & 0 & 0 & -1 & -1 & 3 & -1 & 0 \\ 7 & 0 & 0 & -1 & 0 & 0 & -1 & 3 & -1 \\ 8 & -1 & -1 & 0 & 0 & 0 & 0 & -1 & 3 \end{matrix}$$

No. of non-zero entries = 30

sum of all elements = 0