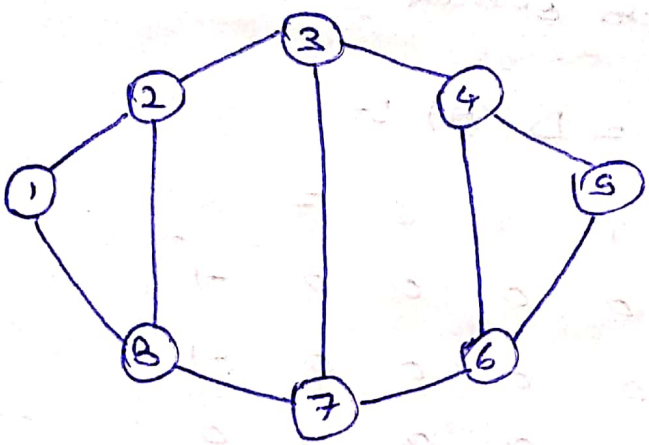
Assignment 5

Communities in Social Network

(1)



Adjacency Matrix :-

	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	1	0
4	0	0	1	0	1	1	0	0
5	0	0	0	1	1	0	0	0
6	0	0	0	1	1	0	1	0
7	0	0	1	0	0	1	0	1
8	1	1	0	0	0	0	1	0

Sum of all entries = 22

No of non zero entries = 22

Degree Matrix D :-

	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

Sum of all entries = 22

No of non zero entries = 8

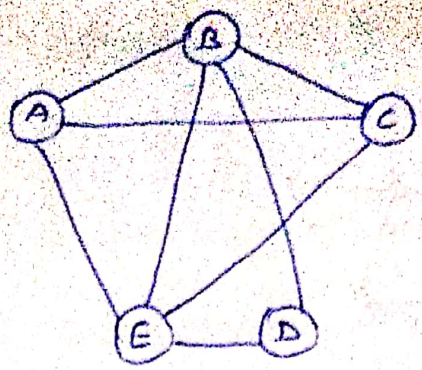
Laplacian Matrix ($L = D - A$) :-

	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	-1	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

Sum of all entries = 0

No of non zero entries = 30

(2)



From the given graph,

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

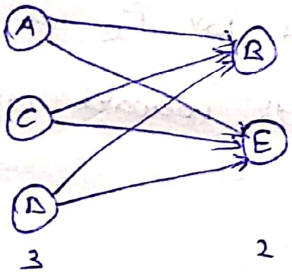
$B = \{A, C, D, E\}$

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

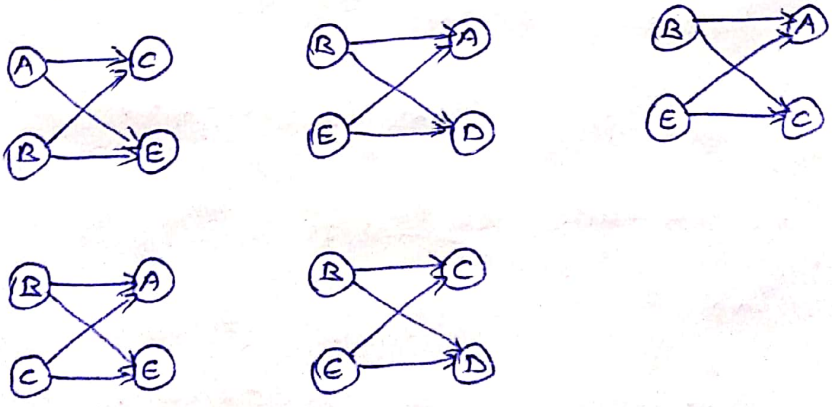
$D = \{B, E\}$

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

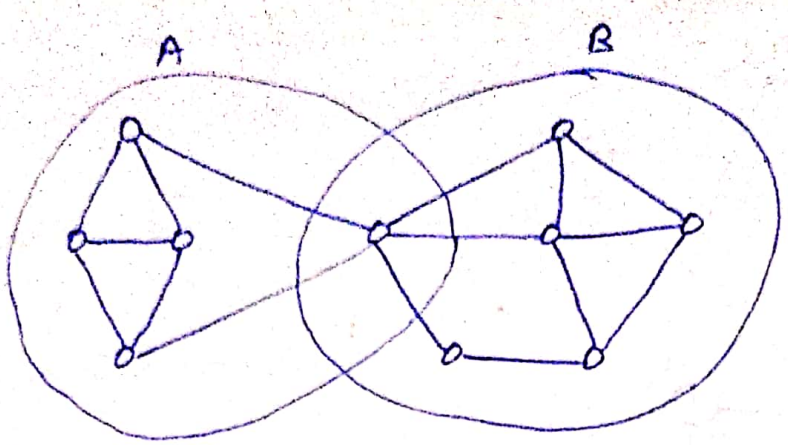
Bipartite subgraph of $K_{3,2}$:

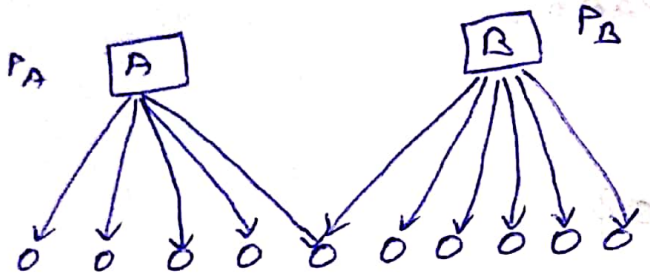


Bipartite subgraph of $K_{2,2}$:



(3)





a) Possible no of edges for P_A is ${}^5C_2 = 10$

But the given edges in the network = 7

$$P_A = \frac{7}{10} = 0.7$$

b) Possible no of edges for P_B is ${}^6C_2 = 15$

But the edges in the network are 9

$$P_B = \frac{9}{15} = 0.6$$