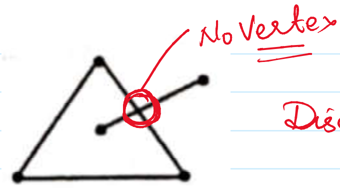
L-24 Connected

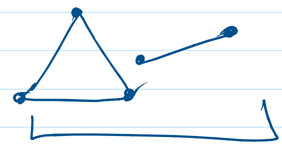
Monday, April 4, 2022 10:04 AM

Component : Each connected subgraph of a disconnected graph are called component.

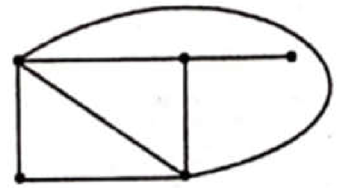
Connected Components (Parts)



Disconnected



2-Component 2-parts

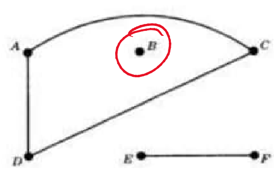


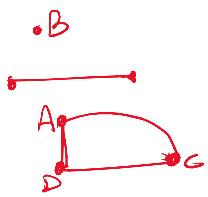
No. of Components = 1

Connected graph.

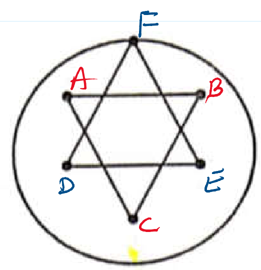
Note:↳ Component of Connected graph is One i.e graph itself

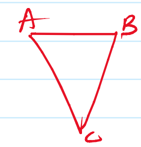
25) The number of connected component of the given graph is





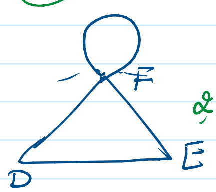
a) 1 b) 2 c) 3 d) 4





1

Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4



2

Art-7. Matrix Representation of Graphs

A graph can be represented by a matrix in two ways :

(*i*) Adjacency matrix

(*ii*) Incidence matrix.

Adjacency Matrix (for undirected graph) :

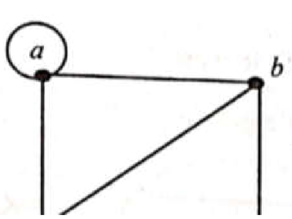
Let G be an undirected graph with n vertices. Further suppose G has no multipl edges. Then G is represented by $n \times n$ matrix defined as $M = [a_{ij}]_{n\times n}$

$$a_{ij} = \begin{cases} 1 & \text{if } a_i \text{ and } a_j \text{ are adjacent} \\ 0 & \text{otherwise} \end{cases}$$

i.e. an entry is 1 if there is an edge between a_i and a_j.

$M = [a_{ij}]_{n\times n}$

n = No. of Vertices

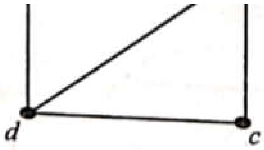


	a	b	c	d
a	1	1	0	1
b	1	0	1	1
c	0	1	0	1

Symmetric Matrix

$M' = M$

$$M = \begin{bmatrix} 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$



b	1	0	1	1
c	0	1	0	1
d	1	1	1	0

$$M = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}_{4\times4}$$

Adjacency matrix of multi-graph (undirected)

Let G be undirected graph of n vertices that may contain parallel edges. Then adjacency matrix M is $n \times n$ matrix defined by $M = [a_{ij}]_{n\times n}$

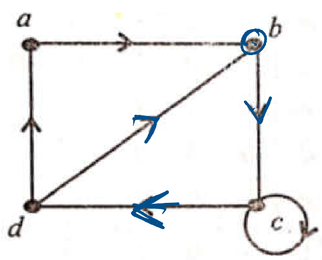
$$\text{where } a_{ij} = \begin{cases} m, & m \text{ is number of edges between } a_i \text{ and } a_j \\ 0 & \text{otherwise} \end{cases}$$

Adjacency matrix of Directed Graph.

Let G be digraph with n vertices having no multiple edges. Then G can be represented by $n \times n$ adjacency matrix m defined by

$$a_{ij} = \begin{cases} 1 & \text{if there is edge from } a_i \text{ to } a_j \\ 0 & \text{otherwise} \end{cases}$$

Not a Symmetric Matrix



	a	b	c	d
a	0	1	0	0
b	0	0	1	0
c	0	0	1	1
d	1	1	0	0

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \end{bmatrix}_{4\times4}$$

Incidence matrix :

Let G be a graph have m vertices and n edges. Then incidence matrix of graph is $m \times n$ matrix written as $A(G) = [a_{ij}]_{m\times n}$ defined by

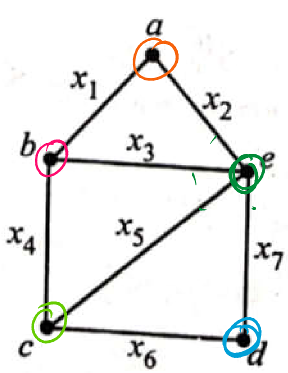
$$a_{ij} = \begin{cases} 1 & \text{if } j\text{th edge } e_j \text{ is incident on } i\text{th vertex } v_i \\ 0 & \text{otherwise.} \end{cases}$$

No. of Vertices = m
No. of edges = n

Order = m × n

Rows (vertices)

Columns (edges)



No. of Vertices = 5
" " Edges = 7

Order of Inc. Matrix = 5×7

	x_1	x_2	x_3	x_4	x_5	x_6	x_7
a	1	1	0	0	0	0	0
b	1	0	1	1	0	0	0
c	0	0	0	1	1	1	0
d	0	0	0	0	0	1	1
e	0	1	1	0	1	0	1

$$\begin{bmatrix} \quad \end{bmatrix}_{5\times 7}$$