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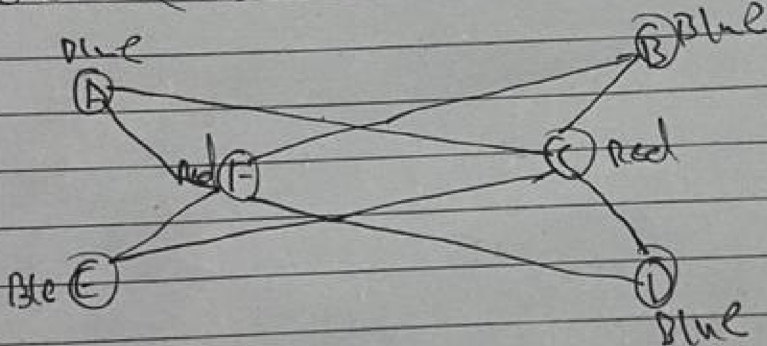
we assig 'Red' to b.
since c is connected to the red b, we assign 'Blue' to c.

we then note that f is connected to the red b and the blue c, which means that we cannot assign a color to f such that it differs from the colors of the connected vertices (as there are only two colors i(red and blue.)

(ii)



we then note that it is Possible to assign red to blue to each vertex such that connected vertices do not have the same color and thus the graph is bipartite.

Moreover, the partitioning of the vertices are the set with the

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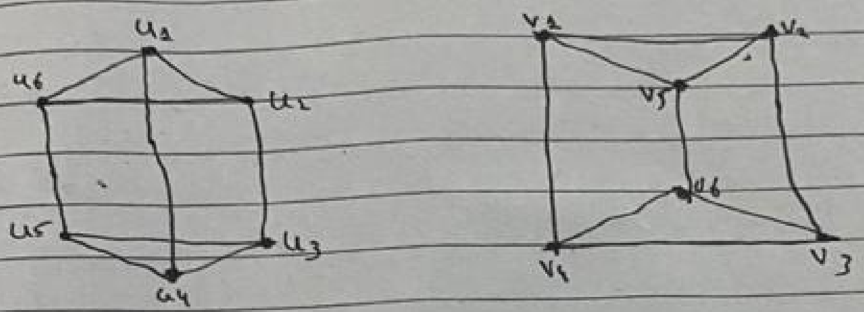
Q2:- Determine whether the given Pair of graph is isomorphic



Two graph G, H are said to be isomorphic if

- their number of componints (vectars & edges) are same

- their edge conecting is retained

if G = H

- $|V(G)| = |V(H)|$
- $|E(G)| = |E(H)|$

- Degree sequences of G and H are same

- The given Graph.

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Q3:- Are the simple graphs with the following adjacency matrices isomorphic.

$$\begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$ (i)

$$\begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$ (ii)

(i) $A = \begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$ $B = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$

Let uss add all elements in the two matrices, which will represent the number of connection of a vertex to another vertex (which is double the number of edges.

A) contian 8 ones and they the simple graph corresponding to A contin 8 connections.

B) contain 10 ones and thus the simple graph corresponding to A contain 10 connections.

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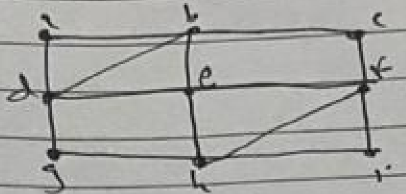
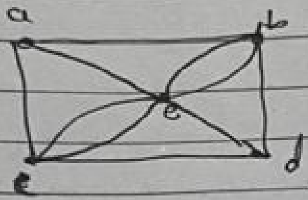
Q.4.)

(i)



(ii)



Euler path:- is a path that uses every edge in a graph with no repeats. It doesn't have return to starting vertex

Euler circuit:- It is a circuit that uses every edge in a graph with no repeats. Being a circuit it must start & end at the same vertex.

(i) A graph contain Euler path if it contains atmost 2 vertices with odd degree.

(ii) A graph contain Euler circuit if all vertices have even degrees.

(i) deg (a) = 2

deg (b) = 4

$\deg(c) = 2$

$\deg(d) = 4$

$\deg(e) = 4$ all degrees are even $\therefore$

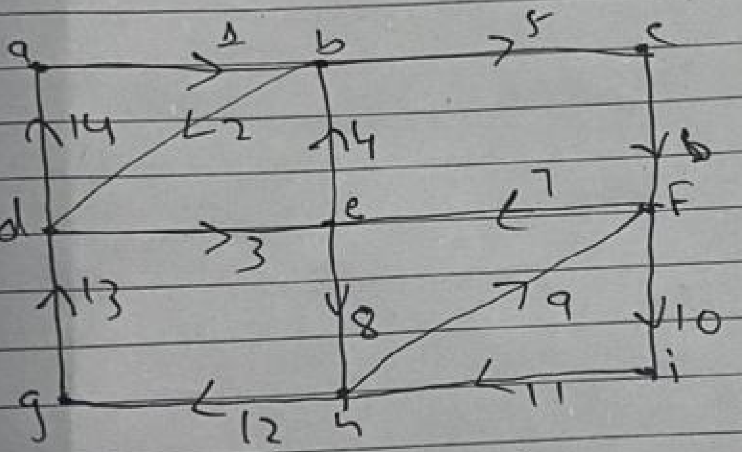
$\deg(f) = 4$ we have euler circuit

$\deg(g) = 2$

$\deg(h) = 4$

$\deg(i) = 2$

And euler circuit is shown below.



path for reaching $a \to a$ is shown by number sequence.

(ii) let us first determine the degree of every vertex in the given graph:

$\deg(a) = 3$

$\deg(b) = 4$

$\deg(c) = 4$

$\deg(d) = 3$

$\deg(e) = 6$