SOMAIYA
VIDYAVIHAR UNIVERSITY

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Course: B.TECH IT SY - DAM
~~Experiment~~ / ~~assignment~~ / tutorial No. 08
Grade: Signature of the Faculty with date

1)

vertex	degree
a	4
b	7
c	4
d	4
e	1
f	4

2) No. we cannot have a graph of three vertices with 1, 3, 5 degrees as this contradicts Handshake Lemma.

sum of degrees of vertices = 2 x no. of edges

$1+3+5 = 2 \times$ no. of edges

$\therefore$ no. of edges $= 4.5$

This cannot be possible.

3) 4 regular graph, no. of edges = 12

degree of every vertex in the graph = 4

No. of vertices = ?

let n be the no. of vertices in the graph

using Handshake Lemma,

$$\Sigma\, d(v) = 2e$$

$$n \times 4 = 2 \times \cancel{12}^{3}$$

$$n = \frac{2 \times \cancel{12}}{\cancel{4}}$$

$$n = 6$$

Total number of vertices in the graph = 6

④ (a)

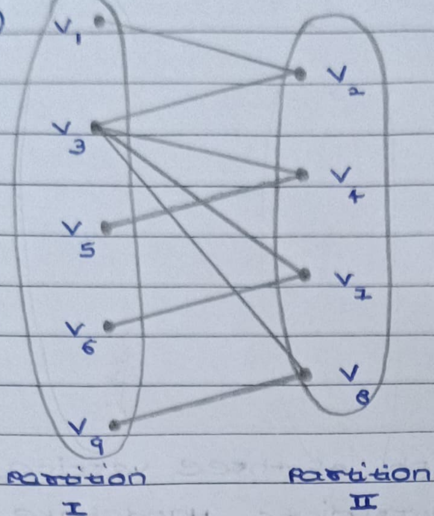
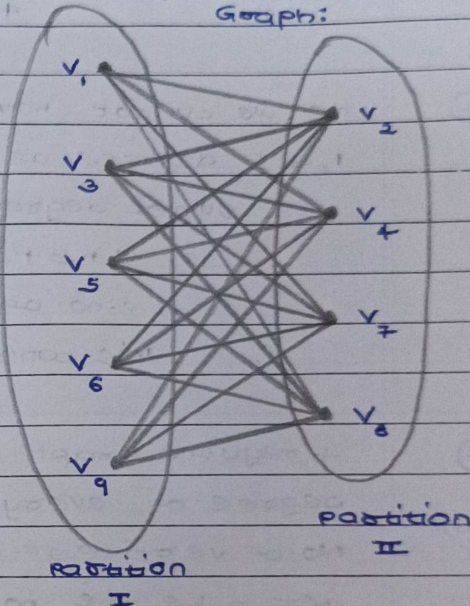


Figure (a) is Bipartite.

12 more edges are required to make it a complete Bipartite graph.

Complete Bipartite Graph:



(b)

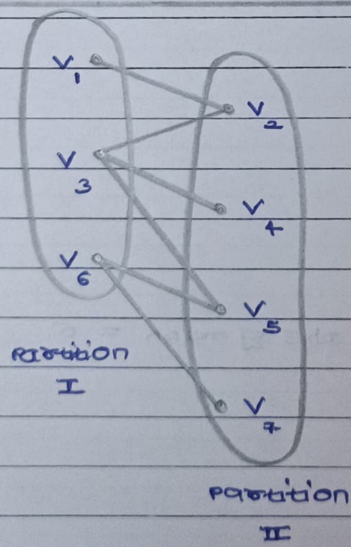
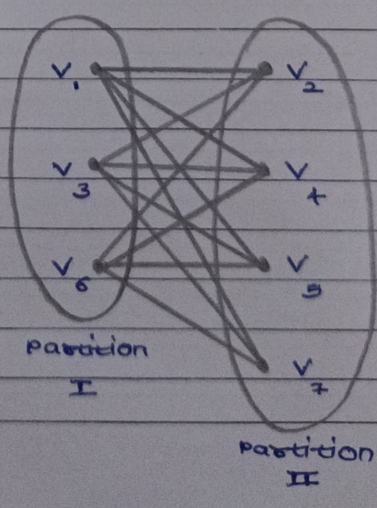


Figure (b) is Bipartite.

6 more edges are required to make it a complete Bipartite graph.



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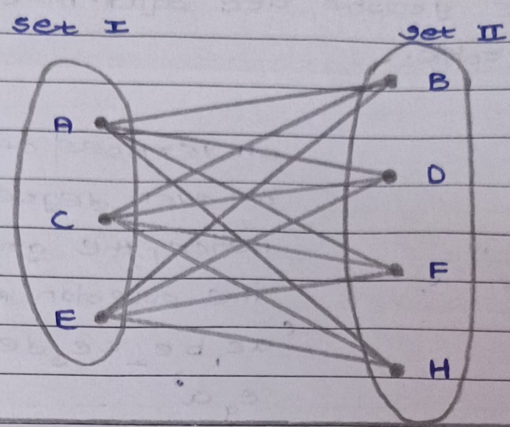
5) $K_{3,4}$

No. of vertices in set I = 3 (suppose A, C, E)

No. of vertices in set II = 4 (suppose B, D, F, H)



6) a)

Graph 1	Graph 2
• 8 vertices	• 8 vertices
• 10 edges	• 10 edges
• 4 (2 degree) vertices	• 4 (2 degree) vertices
• 4 (3 degree) vertices	• 4 (3 degree) vertices

G_1	→	G_2
1	→	a
2	→	c
3	→	b
4	→	d
5	→	e
6	→	g
7	→	f
8	→	h

There exists a bijective function between Graph 1 and Graph 2. No. of vertices, no. of edges, degree of vertex of both the graphs are equal. Therefore, both the graphs are isomorphic.

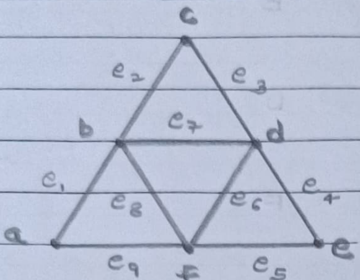
b)

Graph 1	Graph 2
• 5 vertices	• 5 vertices
• 8 edges	• 8 edges
• 4 (3 degree) vertices	• 4 (3 degree) vertices
• 1 (4 degree) vertex	• 1 (4 degree) vertex

G_1	→	G_2
1	→	b
2	→	c
3	→	d
4	→	e
5	→	a

There exists a bijective function between Graph 1 and Graph 2. No. of vertices, no. of edges, degree of vertex of both the graphs are equal. Therefore, both the graphs are isomorphic.

7) a)



All vertices of the graph are of even degree.

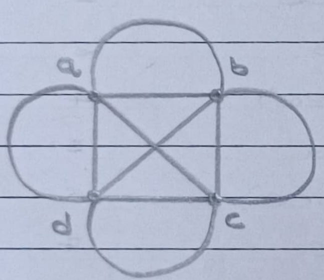
Hence, the graph is Eulerian.

The eulerian ~~trail~~ is -

$a e_1 b e_2 c e_3 d e_4 e e_5 f e_6 d e_7 b e_8 f e_9 a$

All edges are covered, not repeated and the euerian graph (trail) starts and ends with the same vertex.

b)



4 vertices of the graph are of odd degree.

Hence, the graph is not Eulerian.