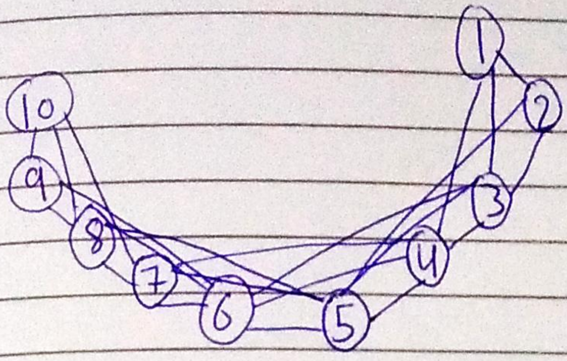
Q1

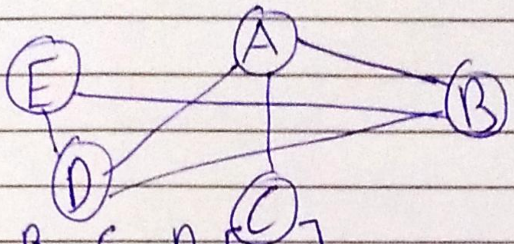


$21 + 2 + 1 = 24$

$e(G) = 24$

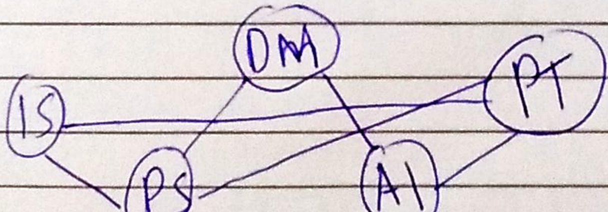
Q_2

(a)



$$\begin{array}{c} \\ A \\ B \\ C \\ D \\ f \end{array} \begin{array}{c} \begin{array}{ccccc} A & B & C & D & E \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix} \end{array}$$

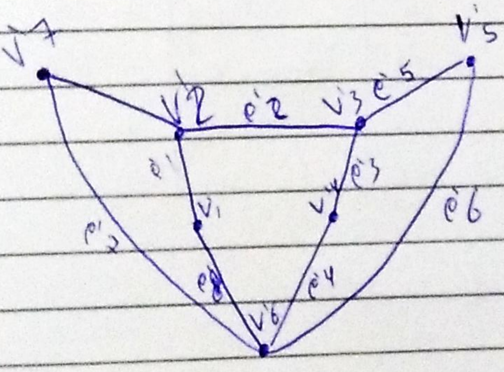
(b)



$$\begin{array}{c} \\ DM \\ PT \\ AI \\ PS \\ IS \end{array} \begin{array}{c} \begin{array}{ccccc} DM & PT & AI & PS & IS \end{array} \\ \begin{bmatrix} 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix} \end{array}$$

Q3

$$\begin{array}{c|c}
 & \begin{matrix} V_1 & V_2 & V_3 & V_4 & V_5 & V_6 & V_7 \end{matrix} \\
\begin{matrix} V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \\ V_6 \\ V_7 \end{matrix} &
\begin{bmatrix}
0 & 1 & 0 & 0 & 0 & 1 & 0 \\
1 & 0 & 1 & 0 & 0 & 0 & 1 \\
0 & 1 & 0 & 1 & 1 & 0 & 0 \\
1 & 0 & 1 & 0 & 0 & 1 & 0 \\
0 & 0 & 1 & 0 & 0 & 1 & 0 \\
1 & 0 & 0 & 1 & 1 & 0 & 1 \\
0 & 1 & 0 & 0 & 0 & 1 & 0
\end{bmatrix}
\end{array}$$



Q4

(G)

$$\begin{array}{cc}
 & \begin{matrix} v_1 & v_2 & v_3 & v_4 \end{matrix} \\
\begin{matrix} V_1 \\ V_2 \\ V_3 \\ V_4 \end{matrix} &
\begin{bmatrix}
1 & 0 & 1 & 0 \\
0 & 0 & 1 & 0 \\
1 & 0 & 0 & 1 \\
0 & 0 & 1 & 0
\end{bmatrix}
\end{array}
\qquad
\begin{array}{cc}
 & \begin{matrix} e_1 & e_2 & e_3 & e_4 & e_5 & e_6 \end{matrix} \\
\begin{matrix} V_1 \\ V_2 \\ V_3 \\ V_4 \end{matrix} &
\begin{bmatrix}
1 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 1 & 0
\end{bmatrix}
\end{array}$$

adjacency　　　　incidence

(H)

$$\begin{array}{cc}
 & \begin{matrix} V_1 & V_2 & V_3 & V_4 \end{matrix} \\
\begin{matrix} V_1 \\ V_2 \\ V_3 \\ V_4 \end{matrix} &
\begin{bmatrix}
1 & 0 & 0 & 0 \\
0 & 1 & 1 & 2 \\
0 & 1 & 1 & 0 \\
0 & 2 & 0 & 0
\end{bmatrix}
\end{array}
\qquad
\begin{array}{cc}
 & \begin{matrix} e_1 & e_2 & e_3 & e_4 & e_5 & e_6 \end{matrix} \\
\begin{matrix} V_1 \\ V_2 \\ V_3 \\ V_4 \end{matrix} &
\begin{bmatrix}
2 & 0 & 0 & 0 & 0 & 0 \\
0 & 2 & 1 & 1 & 1 & 0 \\
0 & 0 & 0 & 0 & 1 & 2 \\
0 & 0 & 1 & 0 & 0 & 0
\end{bmatrix}
\end{array}$$

Q_5 (a)

$V_1 = u_5$ $e_1 = f_4$

$V_2 = u_4$ $e_2 = f_5$

$V_3 = u_2$ $e_3 = f_2$

$V_4 = u_3$ $e_4 = f_3$

$V_5 = u_1$ $e_5 = f_1$

$$AG_1 = \begin{array}{c} \\ V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \end{array}\begin{array}{c} \begin{array}{ccccc} V_1 & V_2 & V_3 & V_4 & V_5 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix} \end{array} \quad AG_2 \begin{array}{c} \\ u_5 \\ u_4 \\ u_3 \\ u_2 \\ u_1 \end{array}\begin{array}{c} \begin{array}{ccccc} u_5 & u_4 & u_3 & u_2 & u_1 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix} \end{array}$$

$\therefore$ they are isomorphic

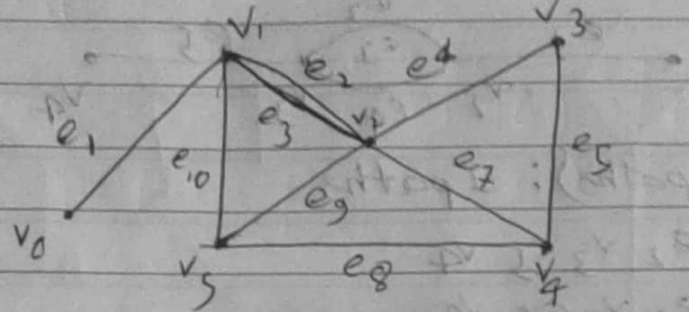
(b)

a_5 and x_3 are coresponding do not have the same degree (5 and 3) the graphs are not isomorphic

Subject :

Date:

Ans to the Q.No-6



a) $v_0 e_1 v_1 e_{10} v_5 e_9 v_2 e_2 v_1 \longrightarrow$ trail

b) $v_4 e_7 v_2 e_9 v_5 e_{10} v_1 e_3 v_2 e_9 v_5 \longrightarrow$ walk

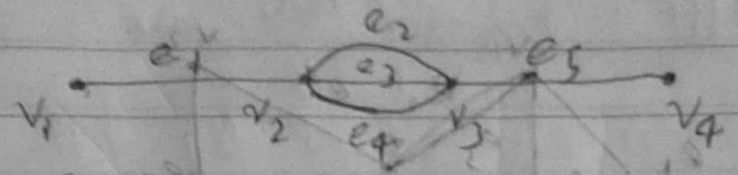
c) $v_2 \longrightarrow$ trivial walk

d) $v_5 e_9 v_2 e_4 v_3 e_5 v_4 e_6 v_4 e_8 v_5 \longrightarrow$ circuit

e) $v_2 e_4 v_3 e_5 v_4 e_8 v_5 e_9 v_2 e_7 v_4 e_5 v_3 e_4 v_2 \longrightarrow$ closed walk

f) $v_3 e_5 v_4 e_8 v_5 e_{10} v_1 e_3 v_2 \longrightarrow$ path

Ans to the Q No-7



a) v_1 to v_4 (paths): 3 paths

→ $v_1 e_1 v_2 e_2 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_3 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_4 v_3 e_5 v_4$

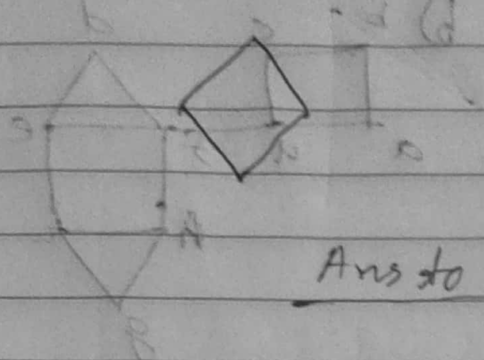
b) v_1 to v_4 trails:-

→ $v_1 e_1 v_2 e_2 v_3 e_4 v_2 e_3 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_3 v_3 e_2 v_2 e_4 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_3 v_3 e_4 v_2 e_2 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_4 v_3 e_2 v_2 e_3 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_4 v_3 e_3 v_2 e_2 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_2 v_3 e_3 v_2 e_4 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_2 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_3 v_3 e_5 v_4$
→ $v_1 e_1 v_2 e_4 v_3 e_5 v_4$

So there are 9 trails

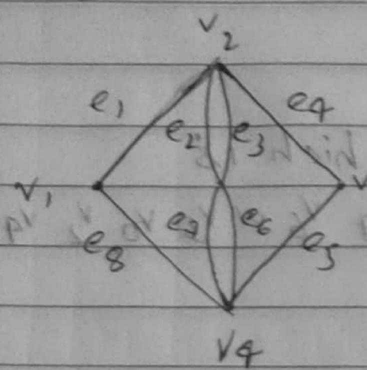
c) v_1 to v_4 infinity walks

Ans to the Q. No - 8

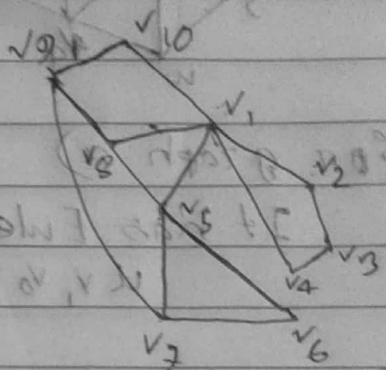


Ans to the Q. No - 8

a)



b)



For graph a,

it has a Euler circuit because all vertices are even degree

for example:

$v_1 e_1 v_2 e_2 v_5 e_7 v_4 e_6 v_5 e_3 v_2 e_4 v_3 e_5 v_4 e_8 v_1$

→ it has same vertices at start and end point

→ every vertex of this graph are used atleast once

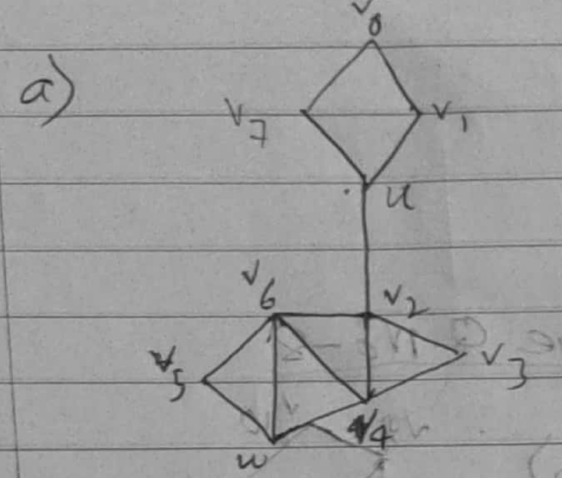
→ every edge of this graph are used exactly once.

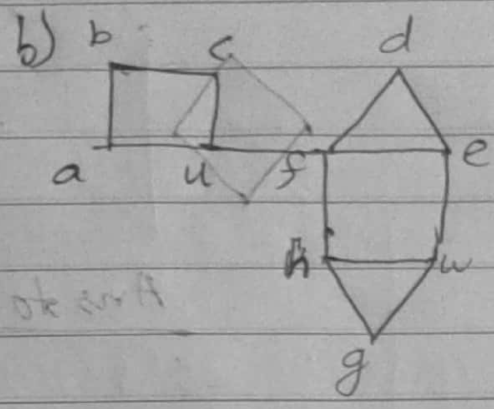
For graph b,

it doesn't have a Eular circuit because the number of degree for vertex, $v_9 = v_8 = v_7 = 3$ and $v_1 = 5$.

Thus its not possible to walk across all of the bridges exactly once and return to start land area

Ans to the Q. No-9





For graph a)

It has Euler path, which is

$u\, v_1\, v_0\, v_7\, u\, v_2\, v_3\, v_4\, v_6\, w\, v_5\, v_0\, v_2\, v_4\, w$

for graph b)

It doesnot have Euler path

Ans to the Q-No-10

From the graph in Question 9

for (a) graph:

It doesnot have have hamilton circuit because vertix u will appear more than once

for (b) graph

doesnot have Hamilton circuit because vertix u will appear more than once

DATE:

Question 11

$m = 3$

$n = 100$

$l = ?$

$$l = \frac{(m-1)n+1}{m}$$

$$= \frac{(3-1)100+1}{3}$$

$$= \frac{2 \cdot 100 + 1}{3}$$

$$= \frac{201}{3}$$

$$= 67$$

$\therefore$ number of leaves is 67

DATE: ____________

Question 12

a) root = a

b) internal vertices = a, b, c, d, e, f, g, h, i, j, n

c) leaves = k, l, m, r, s, o, p, q

d) children of n = r, s

e) parent of e = b

f) siblings of k = l, m

g) proper ancestors of q = j, d, a

h) proper descendants of b = e, f, g, k, l, m, n, r, s

DATE:

Question 13

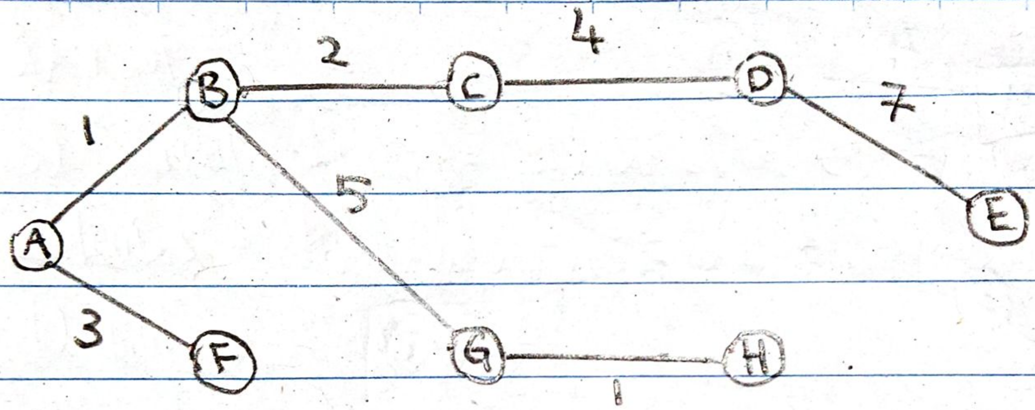
preorder : a, b, e, k, l, m, f, g, n, r, s, c, d, h, o, i, j, p, q

inorder : k, e, l, m, b, f, r, n, s, g, a, c, o, h, d, i, p, j, q

postorder : k, l, m, e, f, r, s, n, g, b, c, o, h, i, p, q, j, d, a

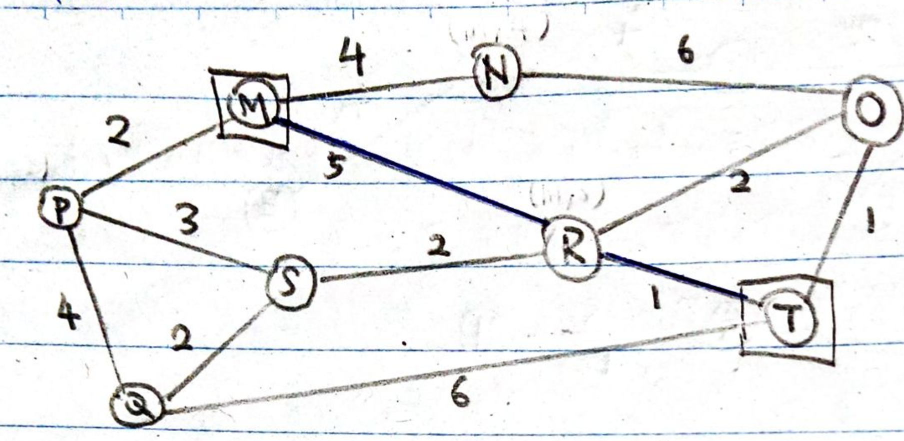
DATE:

Question 14



DATE:

Question 15



No.	S	N	L(M)	L(N)	L(O)	L(P)	L(Q)	L(R)	L(S)	L(T)
0	ϕ	{M,N,O,P,Q,R,S,T}	0	∞	∞	∞	∞	∞	∞	∞
1	{M}	{N,O,P,Q,R,S,T}	0	4	∞	2	∞	5	∞	∞
2	{M,N}	{O,P,Q,R,S,T}	0	4	10	2	∞	5	∞	∞
3	{M,N,O}	{P,Q,R,S,T}	0	4	10	2	∞	5	∞	11
4	{M,N,O,P}	{Q,R,S,T}	0	4	10	2	6	5	5	11
5	{M,N,O,P,Q}	{R,S,T}	0	4	10	2	6	5	5	11
6	{M,N,O,P,Q,R}	{S,T}	0	4	10	2	6	5	5	6
7	{M,N,O,P,Q,R,T}	{S}	0	4	10	2	6	5	5	6

The shortest path from M to T, having weight 6, is M-R-T