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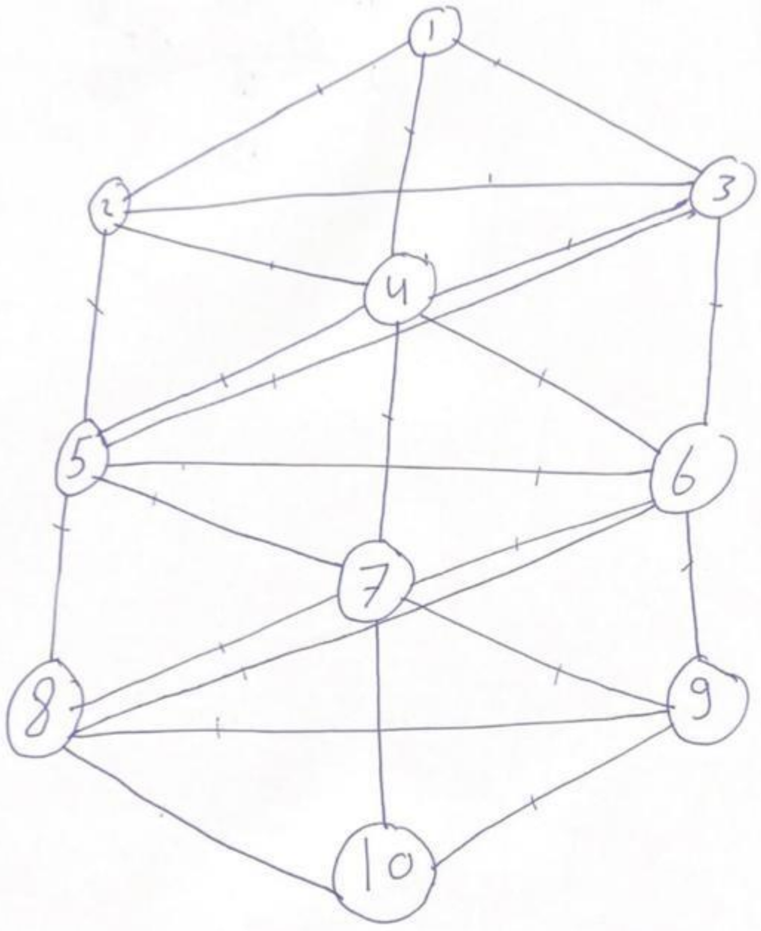
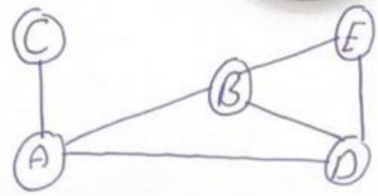
1Q



Number of edges = 24 Edges

Edges list :- (1,2) (1,3) (1,4) (2,3) (2,4) (2,5)
(3,4) (3,5) (3,6) (4,5) (4,6) (4,7)
(5,6) (5,7) (5,8) (6,7) (6,8) (6,9)
(7,8) (7,9) (7,10) (8,9) (8,10) (9,10)

Q 2(a):-

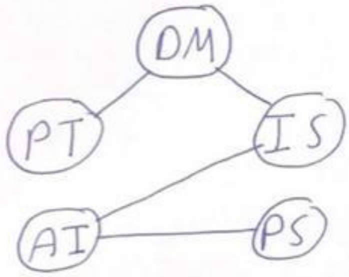


A = Ahmed
C = Chong
D = David
E = Ehsan
B = ~~Ehsan~~ Bakri

Adjacency Matrix:-

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

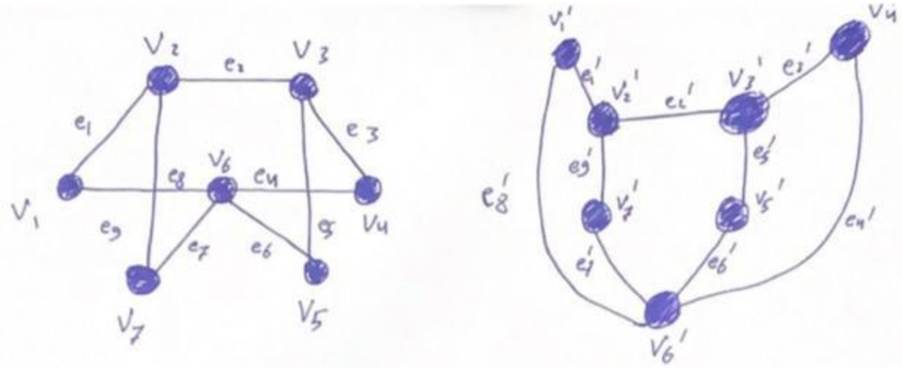
Q 2(b):-



Adjacecy Matrix

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

Q3



The Both graphs are representing the same graph whereas vertics bijectione :-

$V_1 \to V_1'$

$V_2 \to V_2'$

$V_3 \to V_3'$

$V_4 \to V_4'$

$V_5 \to V_5'$

$V_6 \to V_6'$

$V_7 \to V_7'$

And edege bijectione

$e_1 \to e_1'$

$e_2 \to e_2'$

$e_3 \to e_3'$

$e_4 \to e_4'$

$e_5 \to e_5'$

$e_6 \to e_6'$

$e_7 \to e_7'$

$e_8 \to e_8'$

$e_9 \to e_9'$

Q4

The Adjacency Matrix for G

$$
\begin{array}{c}
 \\ V_1 \\ V_2 \\ V_3 \\ V_4
\end{array}
\begin{array}{c}
\begin{array}{cccc} V_1 & V_2 & V_3 & V_4 \end{array} \\
\begin{bmatrix}
e_1(1) & 0 & e_3(1) & 0 \\
0 & 0 & e_4(1) & 0 \\
e_2(1) & 0 & 0 & e_6(1) \\
0 & 0 & e_5(1) & 0
\end{bmatrix}
\end{array}
$$

Incident Matrix for G

$$
\begin{array}{c}
 \\ V_1 \\ V_2 \\ V_3 \\ V_4
\end{array}
\begin{array}{c}
\begin{array}{cccccc} e1 & e2 & e3 & e4 & e5 & e6 \end{array} \\
\begin{bmatrix}
2 & 1 & -1 & 0 & 0 & 0 \\
0 & 0 & 0 & -1 & 0 & 0 \\
0 & -1 & 1 & 1 & 1 & -1 \\
0 & 0 & 0 & 0 & -1 & 1
\end{bmatrix}
\end{array}
$$

Q4

The Adjancey Matrix for H

$$
\begin{array}{c|cccc}
 & v_1 & v_2 & v_3 & v_4 \\
\hline
v_1 & e_1(1) & 0 & 0 & 0 \\
v_2 & 0 & e_2(1) & e_5(1) & e_3,e_4(2) \\
v_3 & 0 & e_5(1) & e_6(1) & 0 \\
v_4 & 0 & e_3,e_4(2) & 0 & 0
\end{array}
$$

The Incident Matrix

$$
\begin{array}{c|cccccc}
 & e_1 & e_2 & e_3 & e_4 & e_5 & e_6 \\
\hline
v_1 & 2 & 0 & 0 & 0 & 0 & 0 \\
v_2 & 0 & 2 & \phi & 1 & 1 & 0 \\
v_3 & 0 & 0 & 0 & 0 & 1 & 2 \\
v_4 & 0 & 0 & 1 & 1 & 0 & 0
\end{array}
$$

Q5 a) They are not isomorphic, because they have not the same edges.

b) They are isomorphic, because they have The same edges and vertices.

Q6 a) Euler trail.

b) Euler Ciruit.

c) closed walks.

d) Euler cycle.

e) Hamilton Circuit.

f) Just walks.

Q7 a) trails: 4 trails

b) Paths: 3 Paths

c) walks: 10 walks

Q8 a) It does have an Euler circuit because every vertex has even degree.

b) It doesnot have an Euler circuit because ~~every~~ some vertex has odd degree.

Q9 a) There is an Euler Path, $(u, v_2, v_3, v_4, v_2, v_6, w)$

b) There is no Euler Path.

Q7 a) There are more than one cennected cycles so there is no Hamiltonian Path.

b) as (a) question there is no Hamiltonian Path.

Q_{11}:

An m-ary tree with n vertices has: $l = \frac{(m-1)n+1}{m}$ Leaves

From the given information, we have $m=3$ $n=100$ so the tree has

$$L = \frac{2 \times 100 + 1}{3} = \frac{201}{3} = 67$$

Q_{12}:

(a) Root:- a

(b) Internal vertices:

e, b, g, n, h, d, j, a

(c) Leaves

~~k, l,~~ K, l, m, f, r, s, c, o, i, 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

(h) proper descendants of b

= e, f, g

Q 13:

preorder

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

inorder

Visit Left most subtree, Visit Root, visit other sub tree from Left to right.

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

postordr ~~visit~~

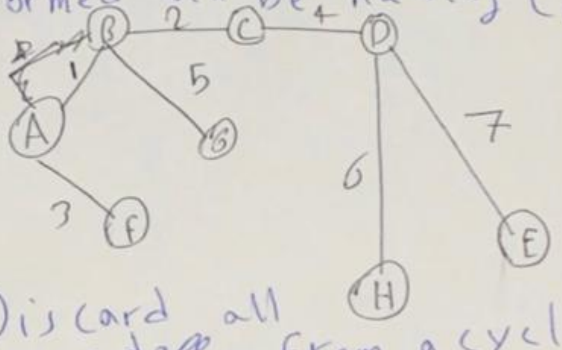
visit Left most subtree, other Left subtree, Right Subtree them Root)

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

Q14

weight	edge (From point	edge (to Point
1	A	B
1	G	H
2	B	C
3	A	F
4	B	F
4	C	D
5	B	G
6	G	C
6	D	H
7	G	D
7	D	E
8	F	G
8	E	H

- The graph contains 8 Vertics and 13 edges. SO, the minimum spanning tree formed will be having (8-1) = 7 edges.



Discard all The edges from a cycle

minimum spanning = 1+2+3+4+5+6+7

= 28

Q_{15}:

Visited Node {P, m, Q, S, N, R, O, T}

P : 0
M : 2
S : 3
Q : 4
N : ∞
R : ∞
O : ∞
T : ∞

P : 0
M : 2
S : 3
Q : 4
N : 6
R : 2 + 5 = 7, 3 + 2 = 5
O : ∞
T : ∞

P : 0
m : 2
S : 3
Q : 4
N : 6
R : 5
O : 7
$\boxed{T : 6}$

P - S - R - T
↓
shortest path