ASSIGMENT 4

DISCRETE STRUCTURE

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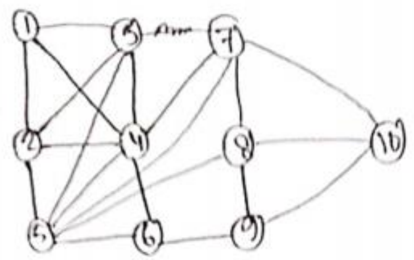
Answer 1:



Edge is valid between vw if $|v-w| \leq 3$

Edges (1,3), (1,2), (2,4), (1,4) (3,4) (2,5) (3,5) (5,4) (4,6) (6,8) (6,9) (8,7) (9,7) (9,10) (8,10) (7,10) (7,4) (5,7), that for all edges $(v-w) \leq 3$

Ans:

Question 2

(a) A: ahmad D: David
B: Bakri E: Ehsan.
C: Chong

	Ahmad	Bakri	David	Chong	Ehsan
Ahmad	0	1	1	1	1
Bakri	0	0	1	0	1
David	0	1	0	1	1
Chong	1	0	0	0	0
Ehsan	0	1	1	1	0

Bakri, David, even all friends of each others

(B) We know that the following subjects can't be scheduled in the same time sla.
(i) DM & IS (ii) DM & PT (iii) AI & PS (iv) IS & AI

DM: Discrete Mathmatics
PT: Programming technique
AI: Artificial Intellegence
PS: Probability statistic
IS: information system

Here are the boolean clause

$((DM \vee PT) \wedge (AI \vee PS)) \vee ((DM \vee AI \wedge (PT \vee PS) \wedge (AI \vee IS))$
$\vee ((DM \vee IS) \wedge (PT \vee PS) \wedge (AI \vee DM) \wedge (AI \vee PS))$

these are the possible scheduling

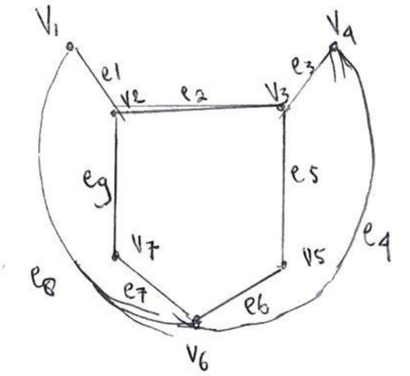
we will write in this smaller clause

G – {DM, PT, AI, PS, IS} = (NOT(V – PT, AI) OR NOT (V, DM, PS) OR NOT (V – AI, PS) OR NOT (V – PT, DM) OR NOT (V – AI, IS))

Question 3

Show that the two drawing represent the same graph:

⇒ So we imagine that the edges are strings and the vertices are knots, Observe the figures on the left-hand side as well as the right-hand side. Count the degree of each vertex & the degree of its adjacent vertices. and then identify the same vertex on the right hand side which represent the same graph given, is:

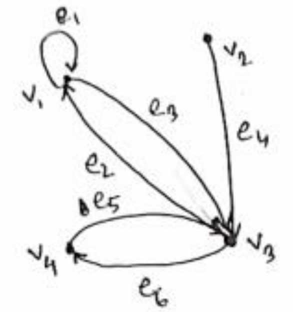


the diagram represents the same graph which on the left-hand side

Question-4-Ans:

The G is given,

G:



Now. Adjacency Matrix:

A_G =

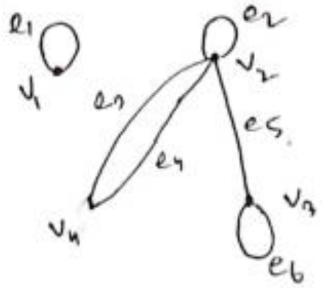
	v_1	v_2	v_3	v_4
v_1	1	0	1	0
v_2	0	0	1	0
v_3	1	0	0	1
v_4	0	0	1	0

Incidence Matrix:

	e_1	e_2	e_3	e_4	e_5	e_6
v_1	0	-1	1	0	0	0
v_2	0	0	0	1	0	0
v_3	0	01	-1	-1	-1	1
v_4	0	0	0	0	1	-1

Now,

Given 'H' :



So, Adjacency Matrix :

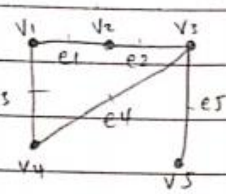
$$A_H = \begin{array}{c|cccc} & v_1 & v_2 & v_3 & v_4 \\ \hline v_1 & 2 & 0 & 0 & 0 \\ v_2 & 0 & 2 & 1 & 2 \\ v_3 & 0 & 1 & 2 & 0 \\ v_4 & 0 & 2 & 0 & 0 \end{array}$$

Incidence Matrix :

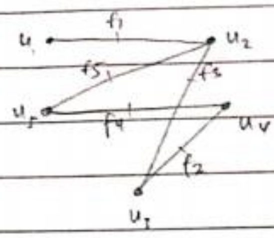
$$\begin{array}{c|cccccc} & e_1 & e_2 & e_3 & e_4 & e_5 & e_6 \\ \hline v_1 & 2 & 0 & 0 & 0 & 0 & 0 \\ v_2 & 0 & 2 & 1 & 1 & 1 & 0 \\ v_3 & 0 & 0 & 0 & 0 & 1 & 2 \\ v_4 & 0 & 0 & 1 & 1 & 0 & 0 \end{array}$$

Q5

a) Isomorphic

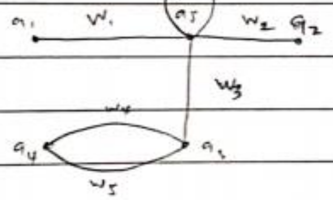


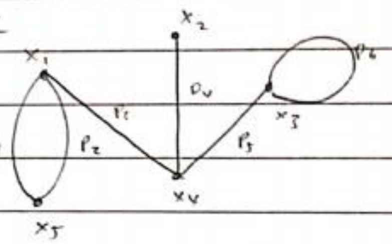
G1



G_2

b) Not Isomorphic





H_1

Question 6.

a) $V_0 e_1 V_1 e_{10} V_5 e_9 V_2 e_2 V_1$: (Trails or no repeated edge)

b) $V_4 e_7 V_2 e_9 V_5 e_{10} V_1 e_3 V_2 e_9 V_5$: (Just walk or repeated edge & vertex)

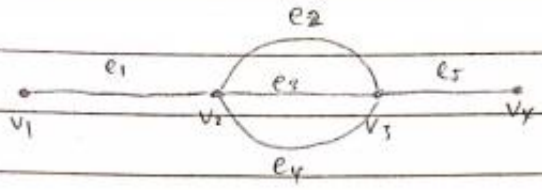
c) V_2 : (This is not a walk)

d) $V_5 e_9 V_2 e_4 V_3 e_5 V_4 e_6 V_4 e_8 V_5$ = Circuit (strart = end vortex, no repeated edge)

e) $V_2 e_4 V_3 e_5 V_4 e_8 V_5 e_9 V_2 e_7 V_4 e_5 V_3 e_4 V_2$ = (closed walk or start-end vertex, repeated edge & vertex)

f) $V_3 e_5 V_4 e_8 V_5 e_{10} V_1 e_3 V_2$ = (Path or no repeated edge & vertex).

Q7



a) Path v_1 to V_4 = 3

- $v_1 e_1 V_2 e_2 V_3 e_5 V_4$
- $v_1 e_1 V_2 e_3 V_3 e_5 V_4$
- $v_1 e_1 V_2 e_4 V_3 e_5 V_4$

b) trails V_1 to V_4 = 6

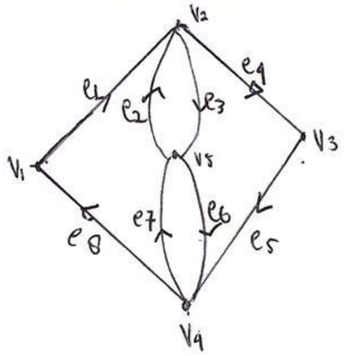
- $V_1 e_1 V_2, e_2 V_3 e_3 V_2 e_4 V_3 e_5 V_4$
- $V_1 e_1 V_2 e_2 V_3 e_4 V_2 e_3 V_3 e_5 V_4$
- $V_1 e_1 V_2 e_3 V_3 e_2 V_2 e_4 V_3 e_5 V_4$
- $V_1 e_1 V_2 e_3 V_3 e_4 V_2 e_2 V_3 e_5 V_4$
- $V_1 e_1 V_2 e_4 V_3 e_2 V_2 e_3 V_3 e_5 V_4$
- $V_1 e_1 V_2 e_4 V_3 e_3 V_2 e_2 V_3 e_5 V_4$

c) Walk V_1 to V_4 = 9

all of trail and path

Question 8

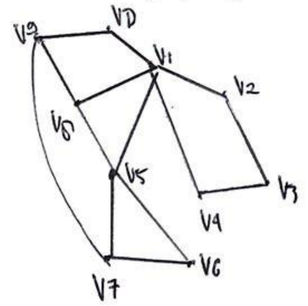
Graph that shown a eular circuit is graph (A).



It's an eular circuit for the graph we can see if $V_1, e_1, V_2, e_4, V_3, e_5, V_4, e_6, V_5, e_2, V_2, V_4, e_7, V_5, e_3, V_2, V_4, e_8, V_1$

this eular path travels every edge once and only once and ends at the same vertex, therefore it is also an eular circuit

and for the graph B Doesn't have an eular circuit



this eular path travels every edge once and only once and starts at difference vertices, this graph can't have an eular circuit since no eular path can start and end at the same vertex without crossing over at least one edge more than once

Ans: 9:

An Euler path is a path which covers every edge of graph exactly once.

(a) ⇒ As all degree is Even. So an Euler path will exist.

It is → $u, v_1, v_0, v_7, u, v_2, v_3, v_4, v_1, v_2, v_4, w, v_5, v_6, w$.

(b) ⇒ Here more than 2 vertices has Degree ODD, For that there will not exist an Euler path.

Ans: 10

The Hamiltonian path exist vertex exactly once In (a) and (b) there are more than one connected cycles.

Therefore, there won't exist any Hamiltonian path.

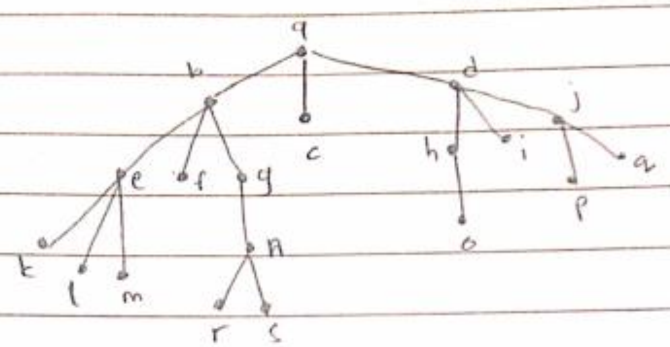
Q11 How leaves 3-ary tree with 100 vertices

$m = 3 \qquad n = 100$

$$l = \frac{(m-1)n+1}{m} \qquad l = \frac{(3-1)(100)+1}{3}$$

$$= 67$$

Q 12



a) Root - a

b) Internal vertices - a, b, d, e, g, h, n, j

c) Leaves - 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, d, a

h) proper descendant of b - e, k, l, m, f, g, n, r, s

Question 13

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

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

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

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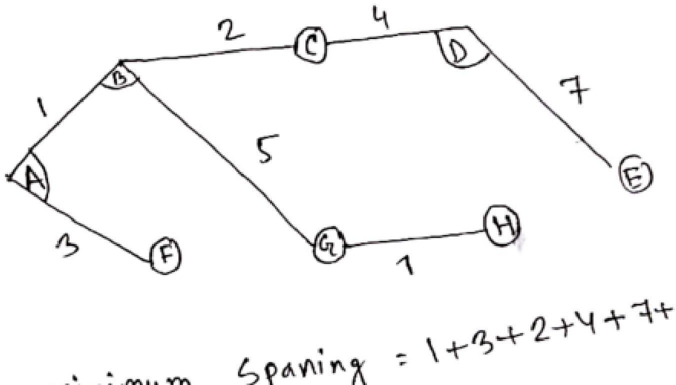
Answer - 14 :

The minimum spaning tree for the following graph using Kruskal's algorithm .

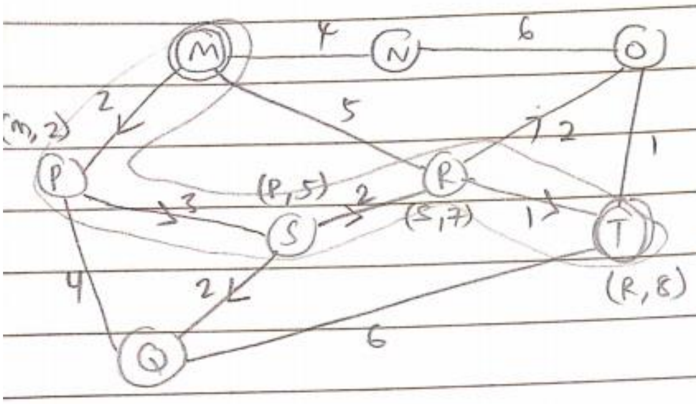
The graph contain 8 vertices and 13 edges
So the minimum spaning tree fomed will be having
$(8-1) = 7$ edges



So minimum Spaning $= 1+3+2+4+7+5+1$
$= 23$

Ans

Q15



M → T