UTM

UNIVERSITI TEKNOLOGI MALAYSIA

ASSIGNMENT:- 04

SCHOOL OF COMPUTING
FACULTY OF ENGINEERING
SUBJECT:-DISCRETE STRUCTURE
SUBJECT CODE:-SECI1013-08

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ANS TO THE QUESTION NUMBER:-01

Sub :

Day

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Answer of the question No. 1:

According to given condition,

	1	2	3	4	5	6	7	8	9	10
1	0	1	1	1	0	0	0	0	0	0
2	1	0	1	1	1	0	0	0	0	0
3	1	1	0	1	1	1	0	0	0	0
4	1	1	1	0	1	1	1	0	0	0
5	0	1	1	1	0	1	1	1	0	0
6	0	0	1	1	1	0	1	1	1	0
7	0	0	0	1	1	1	0	1	1	1
8	0	0	0	0	1	1	1	0	1	1
9	0	0	0	0	0	1	1	1	0	1
10	0	0	0	0	0	0	1	1	1	0

So, the edge are

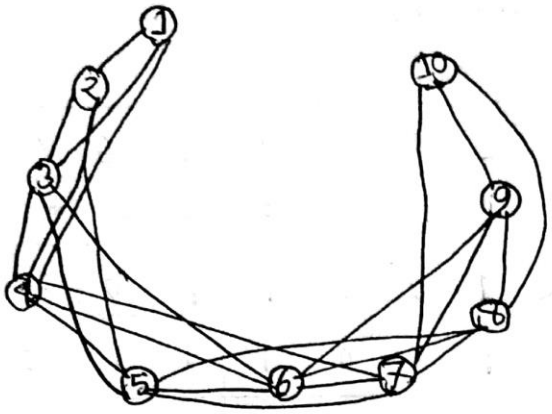
(1,2), (1,3), (1,4), (2,3), (2,4), (2,5), (3,4), (3,5), (3,6), (4,5), (4,6), (4,7), (5,6), (5,7), (5,8), (6,7), (6,8), (6,9), (7,8), (7,9), (7,10), (8,9), (8,10), (9,10)

So,

$\therefore e(G) = 29$

P.T.O.

Graph (G):



so, total number of edges

$e(G) = 24$.

ANS TO THE QUESTION NUMBER :-02

Ans to the question NO: 02

(a) let

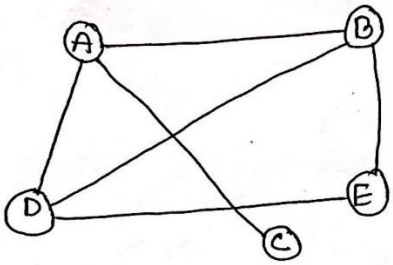
A = Ahmed

B = Baker

C = Chong

D = David

E = Ehsan



following graph is

	A	B	C	D	E
A	0	1	1	1	0
B	1	0	0	1	1
C	1	0	0	0	0
D	1	1	0	0	1
E	0	1	0	1	0

02 (b)

There are 5 subjects

Let,

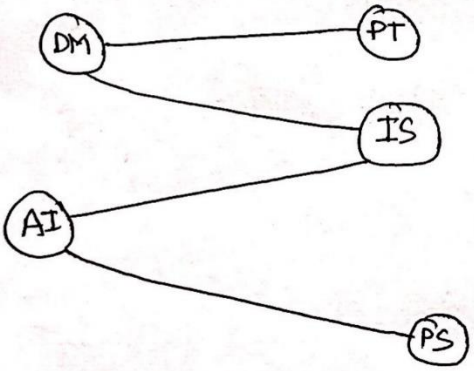
Discrete Mathmatics = DM

Programming Technique = PT

Artificial Intelligence = AI

Probability statistic = PS

Information system = IS



ANS TO THE QUESTION NUMBER :-03

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Answer of the question No. 3:

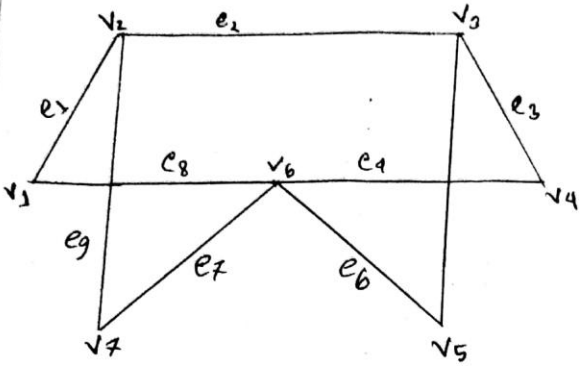

Fig (1)
Graph (1)

Fig (2)
Graph (2)

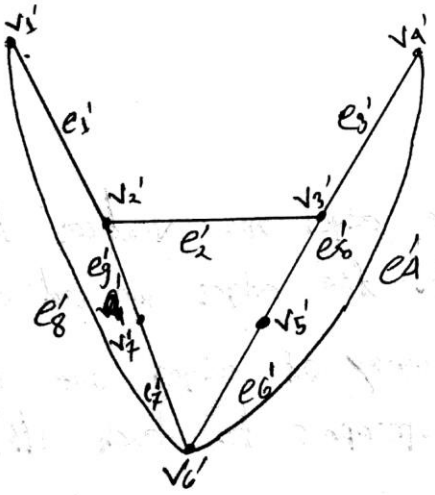

Fig (2)
Graph (2)

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Both graphs are isoporphic by the following corresponding.

$v_1 \longrightarrow v_1'$
$v_2 \longrightarrow v_2'$
$v_3 \longrightarrow v_3'$
$v_4 \longrightarrow v_4'$
$v_5 \longrightarrow v_5'$
$v_6 \longrightarrow v_6'$
$v_7 \longrightarrow v_7'$

Edge

$e_1 \longrightarrow e_1'$
$e_2 \longrightarrow e_2'$
$e_3 \longrightarrow e_3'$
$e_4 \longrightarrow e_4'$
$e_5 \longrightarrow e_5'$
$e_6 \longrightarrow e_6'$
$e_7 \longrightarrow e_7'$
$e_8 \longrightarrow e_8'$

So, we can say that the edges are vertices the left side graph corresponded to the edges and vertices of the right side graph and adjacency of edges are preserved. So, both graphs are isomorphic to each other.

ANS TO THE QUESTION NUMBER :-04

Answer to the question NO: 4

Adjacency and incidence matrices of graph '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

	e_1	e_2	e_3	e_4	e_5	e_6
v_1	2	1	1	[illegible]	0	0
v_2	0	0	0	1	0	0
v_3	0	1	1	1	1	1
v_4	0	0	0	0	1	1

(9)

Adjacent and Incidence matrix of graph 'H'

	v_1	v_2	v_3	v_4
v_1	1	0	0	0
v_2	0	1	1	2
v_3	0	1	1	0
v_4	0	2	0	0

	e_1	e_2	e_3	e_4	e_5	e_6
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

ANS TO THE QUESTION NUMBER :-05

Answer to the question NO:-5

(a) (i) G_1 has 5 vertices and 5 edges.

G_2 has also 5 vertices and 5 edges

(ii) 'G_1' has 3 vertices with 2 degrees, 1 vertex with 2 degrees and 1 vertex with 1 degree.

G_2 has also 3 vertices with 2 degrees I vertex with 3 degrees and 1 vertex with 1 degree.

(5)

(iii)

$f(v_1 G_{1_1}) = f(U_4 G_{1_2})$

$f(v_2 G_{1_1}) = f(U_5 G_{1_2})$

$f(v_3 G_{1_1}) = f(U_2 G_{1_2})$

$f(v_4 G_{1_1}) = f(U_3 G_{1_2})$

$f(v_5 G_{1_1}) = f(U_1 G_{1_2})$

(iv) G_{1_1} and G_{1_2} both are simple graph.

So,
we call,
G_{1_1} and G_{1_2} are isomorphic.

5 (b)

(i) H_1 has 5 vertices and 6 edges

H_2 " 5 " and 6 "

(ii) H_1 has 1 vertex with 4 edges,
2 vertices with 1 edges and 2 vertices
with 2 edges.

~~but~~
but,
H_2 has 2 vertices a with 3 edges,
2 vertices with 2 edges and 1
vertex with 1 edge

which is not similar to 'H_1',
that's why "H_1 and H_2 graphs
are not isomorphic.

ANS TO THE QUESTION NUMBER :-06

Answer to the question NO:06

(a) v_0 e_1 v_1 e_{10} v_5 e_2 v_2 e_2 v_1

it's a trial because it doesn't contain any 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

it's also a trail

(c) v_2

it's a trival walk because it has only one vertex and contains zero edges.

(6)

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

is a circuit cycle

(e) $v_2\ e_4\ v_3\ e_5\ v_4\ e_8\ v_5\ e_9\ v_2\ e_7\ v_4\ e_5\ v_3\ e_4\ v_2$

is a closed walk.

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

is a path.

ANS TO THE QUESTION NUMBER :-07

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Answer of the question NO. 7:

a) Path 1 :→ v1e1v2e3v3e5v4

Path 2 :→ v1e1v2e4v3e5v4

Path 3 :→ v1e1v2e2v3e5ev4

So, three paths are there from v1 to v4

(Ans)

b) Vertices may repeat but edges may not repeat

So, 3 trails.

Because we need not to repeat any edge, hence only above showing paths will as also be trails as well.

c) Walk 1 : v1e1v2e3v3e5v4

Walk 2 : v1e1v2e4v3e5v4

Walk 3 : v1e1v2e2v3e5ev4

Walk 4 : v1e1v2e2v3e4v2e3v3 ---. infinite times e5v4

Except 3 paths the number of walks can be infinite, because given graph has loops with non-directed edge.

So, Infinite walks possible.

ANS TO THE QUESTION NUMBER :-08

Day

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Answer of the question No.8:

A Euler circuit in a graph is a cycle in which each and every edge is touched once. For a graph to be a Euler circuit, degree of every vertex should be even. As every vertex is touched once, while tracing a circuit, one must enter and exit a vertex through different edges. So, the degree of vertex should be even.

Let us consider graph a,

degree of every vertex is even for graph a.

So, we can describe a Euler circuit in graph a.

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

Now according to graph b,

every vertex of which is not of even degree v_1, v_3, v_7 and v_5 are the vertices with odd degree. While tracing a circuit each time these vertices are touched, entry and exit through different vertices are not possible. So, graph b doesn't contain Euler circuit.

ANS TO THE QUESTION NUMBER :-09 & 10

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Answer of the question No. 9.

We know, A path is Eulerian when there are ~~almost~~ 2 vertices with odd degree.

a) There are vertices with odd degree u and w. so, it has a Eulerian path between v and w

The Eulerian path is $vv_7v_0v_1vv_2v_3v_4v_2v_6v_4wv_6v_5w$

b) There are 4 vertices with odd degree v, w, e, h,
so, it does not have a Eulerian path.

Answer of the question No. 10:

We know, A path is Hamiltonian when ~~every~~ every vertex ~~once~~ is visited by it.

a) so, the path needs to visit vertices v and v_2 twice. hence it can not have a Hamiltonian circuit.

b) here, the path needs to visit u and f twice. so it cannot have a Hamiltonian circuit.

ANS TO THE QUESTION NUMBER :-11 & 12

Ans. to the Ques. NO.11.

A fully 3-ary tree with 100 internal vertices has, $L = (3-1) \times 100 + 1$ leaves

$= 2 \times 100 + 1$

$= 201$ leaves.

Ans.

Ans. to the Ques. NO.12.

According to the Figure - 1,

a). Root = a

b) Internal Vertices = a, b, d, j, h, e, g, n

c) Leaves = k, l, m, f, r, s, o, i, p, q,

d) Children of n = r, s

e) Parent of e = b

f) Sibilings of k = l, m

g) Proper ancestors of q = j

h) Proper descendants of b = e, f, g

ANS TO THE QUESTION NUMBER :-13

Ans. to the Ques. NO. 13.

* Preorder :

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

* Inorder :

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

* Post order :

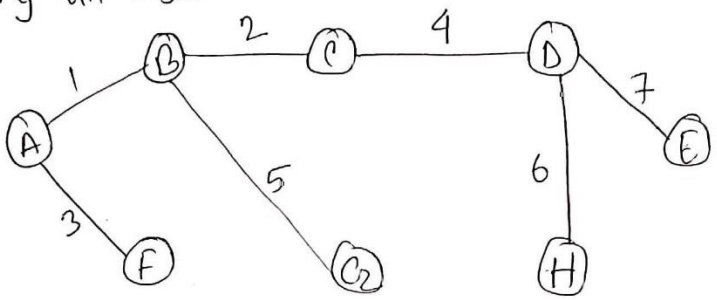
k, l, m, e, f, r, s, n, g, b, c,
o, h, i, p, q, j, d, a.

Ans.

ANS TO THE QUESTION NUMBER :-14 & 15

Ans. to the Ques. NO. 14.

Discarding all edges



Minimum Spanning,

$1+2+3+4+5+6+7$

$= 28$ Ans.

Ans. to the Ques. NO. 15.

Iteration	S	N	L(M)	L(N)	L(O)	L(P)	L(Q)	L(R)	L(S)	L(T)
0	{ }	{M,N,O,P,Q,R,S,T}	0							
1	{M}	{N,O,P,Q,R,S,T}	0	4		2		5		
2	{M,P}	{N,O,Q,R,S,T}	0	4		2	6	5	5	
3	{M,P,N}	{O,Q,R,S,T}	0	4	10	2	6	5	5	
4	{M,P,N,R}	{O,Q,S,T}	0	4	7	2	6	5	5	6
5	{M,P,N,R,S}	{O,Q,T}	0	4	7	2	6	5	5	6
6	{M,P,N,R,S,Q}	{O,T}	0	4	7	2	6	5	5	6
7	{M,P,N,R,S,Q,T}	{O}	0	4	7	2	6	5	5	6

Now, Shortest length = 6

Shortest Path = M(R)R(R)T Ans.