



UTM

UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING

SEMESTER 1

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SECI 1013 - DISCRETE STRUCTURE

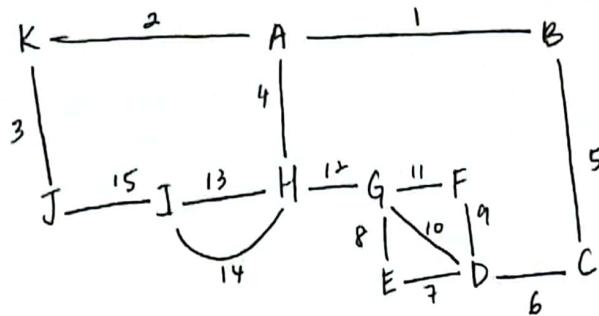
ASSIGNMENT 4 (CHAPTER 4 AND CHAPTER 5)

SECTION 02

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- 1 a) • not inspecting the same street more than once
 \Rightarrow use all edge, cannot repeat edge
 • Start from A



Ans: (A, 1, B, 5, C, 6, D, 9, F, 11, G, 10, D, 7, E, 8, G, 12, H, 4, A, 2, K, 3, J, 15, I, 13, H, 14, I)

The guard will not be back at the guard house at the end of the inspection.

Vertex	A	B	C	D	E	F	G	H	I	J	K
degree	3	2	2	4	2	2	4	4	3	2	2

This is because only vertex A and vertex I have odd degree, and this satisfy the theory of Euler trail.

- b) • visit each street intersection exactly once
 • doesn't include all streets
 • begin & end at A

Ans: (A, 1, B, 5, C, 6, D, 7, E, 8, G, 12, H, 13, I, 15, J, 3, K, 2, A)

It is not possible to visit each street intersection exactly once that begin and end at A.

This is because F will not be visited and street intersection at G, E, D will be visited more than once if the Hamiltonian circuit is performed.

2 a)

S	N	L(A)	L(B)	L(C)	L(D)	L(E)	L(F)
{ }	{B, A, C, D, E, F}	∞	0	∞	∞	∞	∞
{B}	{A, C, D, E, F}	3		1	6	∞	∞
{B, C}	{A, D, E, F}	3			5	5	∞
{B, C, A}	{D, E, F}				5	5	8
{B, C, A, D}	{E, F}					5	8
{B, C, A, D, E}	{F}						7
{B, C, A, D, E, F}	{ }						

b) The shortest path from B to F is B-A-F, with the minimum 8 hours.

3.a) The ancestors of p are p, n, i, d and a.

b) The inorder traversal is : k, e, l, b, a, f, c, m, g, h, d, p, n, i, o, j

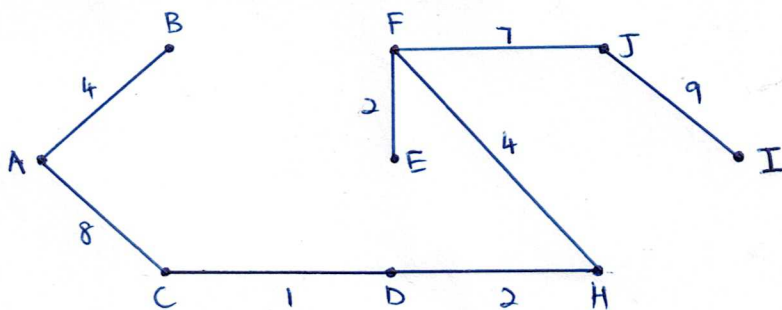
4.a) The path highlighted in red does not connect all the vertices. For example, vertex I stands alone and vertex A and B are also not connected to other vertices.

b)

List of edges	Length of edges
CD	1
DH	2
EF	2
AB	4
FH	4
DE	6
CE	7
FJ	7
AC	8
BF	8
JI	9
IH	10
JH	14

Shortest edge in network that doesn't create a cycle :

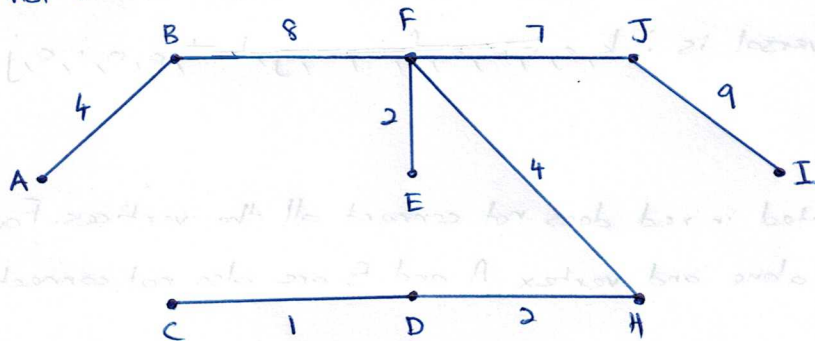
CD	1
DH	2
EF	2
AB	4
FH	4
FJ	7
AC	8
JI	9



$$\text{Total length of network} = 1 + 2 + 2 + 4 + 4 + 7 + 8 + 9 \\ = 37 \text{ m}$$

$$\text{Total cost} = 37 \times \text{RM}100 \\ = \text{RM } 3700$$

4. c) Yes, edge BF can be chosen instead of AC as it is the same length and does not form a cycle.

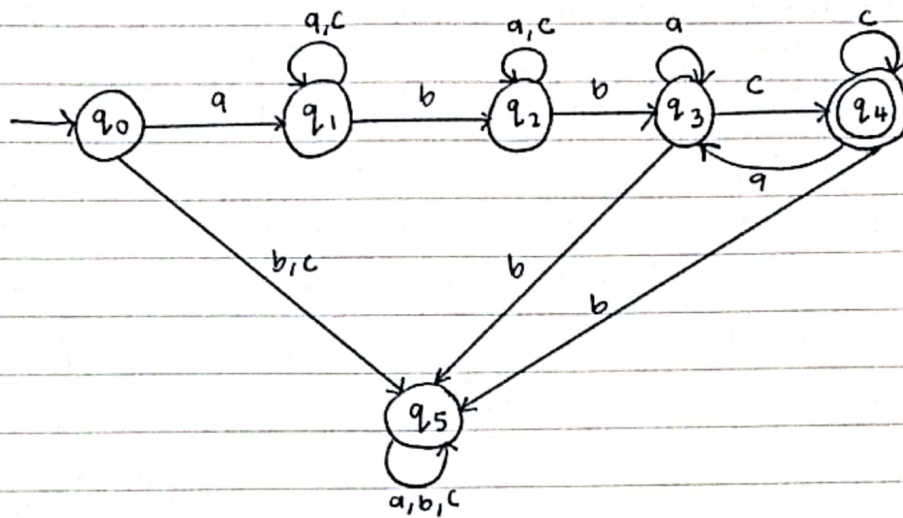


total distance of edges is 31

1	AB
2	BC
2	CD
2	DE
2	EF
2	FG
2	GH
2	HI
2	IF
2	AC
2	BD

edges to reject	edges to keep
1	CD
2	DE
2	EF
2	FG
2	GH
2	HI
2	IF
2	AC
2	BD
2	CE
2	DF
2	EG
2	FH
2	GI
2	HA
2	IB
2	JC
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2	NH
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2	QB
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2	XI
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Question 5



Question 6

a) $S = \{v, w, x, y, z\}$

initial state = $\{w\}$

b) input string: 0100

$w \xrightarrow{0} v \xrightarrow{1} y \xrightarrow{0} z \xrightarrow{0} z$

Question 7

transition table

	fs			fo		
	0	1	2	0	1	2
q_0	q_0	q_1	q_2	0	2	2
q_1	q_0	q_1	q_2	1	0	2
q_2	q_0	q_1	q_2	1	1	0

State:

q_0 : Ground floor

q_1 : First floor

q_2 : second floor

Input:

0: Button ground floor

1: Button first floor

2: Button second floor

output:

0: Does not move

1: Move down

2: Move up