UTM
UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING

SEMESTER 1 2023/2024

SECI1013 – DISCRETE STRUCTURE

SECTION 3

ASSIGNMENT 4

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

- No. The guard will not at the guard house at the end of the inspection
- The route must use each street exactly once, so it will not go back to guard at the end
- This is a Euler Trail. because it has vertices having odd degree. Euler trail is a graph that start and end at different vertex but use every edge exactly once.

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(b) Cannot. If the security guard want to visit each street intersection for the neighbourhood exactly once to switch off the street light before they end the night shift beginning and ending at A, it should has an Hamiltonian circuit.
But he need repeated visit one of the street intersection to form a circuit.
Thus, it is not halmiltonian circuit.

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2.(A)

No.	S	N	L(A)	L(B)	L(C)	L(D)	L(E)	L(F)
0	{}	{A,B,C,D,E,F}	∞	0	∞	∞	∞	∞
1	{B}	{A,C,D,E,F}	3	0	1	6	∞	∞
2	{B,C}	{A,D,E,F}	3	0	1	5	5	∞
3	{A,B,C}	{D,E,F}	3	0	1	5	5	8
4	{A,B,C,D}	{E,F}	3	0	1	5	5	8
5	{A,B,C,D,E}	{F}	3	0	1	5	5	7
6	{A,B,C,D,E,F}	{}	3	0	1	5	5	7

(b) shortest path : B → C → E → F

Minimum hour : 7 hour

3. (A) ancestors of P = P , n , i , d , a

(b)

k e l b a f c m g h d n i o j
                          |
                          p

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

4a. This is because not all vertices are connected together.

b.
CD=1	FJ=7
DH=2	AC=8
EF=2	BF=8 ✗
AB=4	JI=9
FH=4	HI=10✗
DE=6✗	BC=11✗
CE=7✗	HJ=14✗
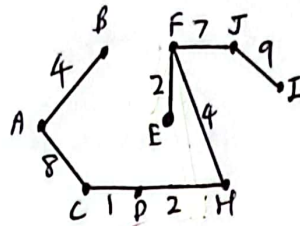
Length = 1+2+2+4+4+7+8+9
= 37 meters

Total cost = 37 × 100
= RM3700

c. Yes, there are more than one distinct MST obtained for the Figure 4.

CD=1	FJ=7
DH=2	BF=8
EF=2	AC=8✗
AB=4	JI=9
FH=4	HI=10✗
DE=6✗	BC=11✗
CE=7✗	HJ=14✗
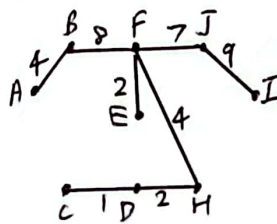
Length = 1+2+2+4+4+7+8+9
= 37 meters

5.
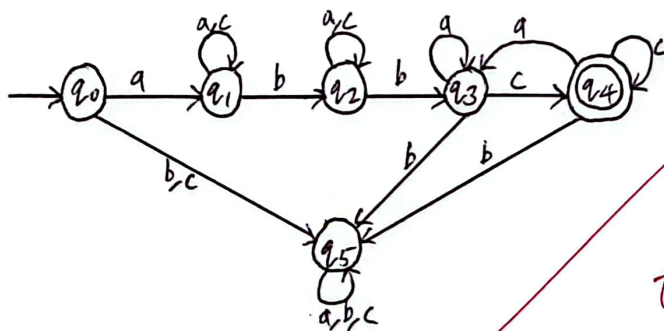
ba. set of states, $S = \{v, w, x, y, z\}$
   initial state $q_0 = w$ 2

b.

∴ Input string that can be accepted = 0111.   3

7. Let $M = \{S, I, O, q_0, f_S, f_0\}$
   where $S = \{q_0, q_1, q_3\}$ (q_0 means ground floor; q_1 means floor 1; q_2 means floor 2)
   $I = \{0, 1, 2\}$
   $O = \{0, 1\}$ (0 means no change; 1 means goes up or goes down)
   $q_0 = $ initial state

	f_S			f_0		
	0	1	2	0	1	2
q_0	q_0	q_1	q_2	0	1	1
q_1	q_0	q_1	q_2	1	0	1
q_2	q_0	q_1	q_2	1	1	0