Tan Jian Xin A24CS0303

Liew Shan Neng A24CS0263

Kor Yee Heng A24CS0257

Sivaraj A/L Sivakumar A24CS0194

Scanned with CamScanner

CamScanner

Q1

1) Dijkstra's algorithm is an algorithm for finding the shortest paths between nodes in a weighted graph

2) a) a, f

Literation	S	N	L(a)	L(b)	L(e)	L(h)	L(c)	L(f)	L(i)	L(d)	L(g)	L(j)
0	{ }	{a,b,e,h,c,f,i,d,g,j}	0	∞	∞	∞	∞	∞	∞	∞	∞	∞
1	{a}	{b,e,h,c,f,i,d,g,j}	0	(3)	5	4	∞	∞	∞	∞	∞	∞
2	{a,b}	{e,h,c,f,i,d,g,j}	0	3	5	(4)	5	10	∞	∞	∞	∞
3	{a,b,h}	{e,c,f,i,d,g,j}	0	3	(5)	4	5	9	6	∞	∞	∞
4	{a,b,h,e}	{c,f,i,d,g,j}	0	3	5	4	(5)	9	6	∞	∞	∞
5	{a,b,h,e,c}	{f,i,d,g,j}	0	3	5	4	5	7	(6)	8	11	∞
6	{a,b,h,e,c,i}	{f,d,g,j}	0	3	5	4	5	(7)	6	8	11	12
7	{a,b,h,e,c,i,f}	{d,g,j}	0	3	5	4	5	7	6	8	11	12

shortest path : a → b → c → f which is 7

b) b, j

Literation	S	N	L(b)	L(c)	L(e)	L(f)	L(d)	L(g)	L(j)	L(i)	L(h)	L(z)
0	{ }	{b,c,e,f,d,g,j,i,h,z}	0	∞	∞	∞	∞	∞	∞	∞	∞	∞
1	{b}	{c,e,f,d,g,j,i,h,z}	0	(2)	5	7	∞	∞	∞	∞	∞	∞
2	{b,c}	{e,f,d,g,j,i,h,z}	0	2	5	(4)	5	8	∞	∞	∞	∞
3	{b,c,f}	{e,d,g,j,i,h,z}	0	2	(5)	4	5	8	7	8	9	∞
4	{b,c,f,e}	{d,g,j,i,h,z}	0	2	5	4	(5)	8	7	8	9	∞
5	{b,c,f,e,d}	{g,j,i,h,z}	0	2	5	4	5	8	(7)	8	9	7
6	{b,c,f,e,d,j}	{g,i,h,z}	0	2	5	4	5	8	7	8	9	7

shortest path : b → c → f → j which is 7

c) a, g

Literation	S	N	L(a)	L(b)	L(e)	L(h)	L(c)	L(f)	L(i)	L(d)	L(g)	L(j)	L(z)
0	{ }	{a,b,e,h,c,f,i,d,g,j,z}	0	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
1	{a}	{b,e,h,c,f,i,d,g,j,z}	0	(3)	5	4	∞	∞	∞	∞	∞	∞	∞
2	{a,b}	{e,h,c,f,i,d,g,j,z}	0	3	5	(4)	5	10	∞	∞	∞	∞	∞
3	{a,b,h}	{e,c,f,i,d,g,j,z}	0	3	(5)	4	5	10	6	∞	∞	∞	∞
5	{a,b,h,e}	{c,f,i,d,g,j,z}	0	3	5	4	(5)	9	6	∞	∞	∞	∞
6	{a,b,h,e,c}	{f,i,d,g,j,z}	0	3	5	4	5	7	(6)	8	11	∞	∞
7	{a,b,h,e,c,i}	{f,d,g,j,z}	0	3	5	4	5	7	6	(8)	11	12	∞
8	{a,b,h,e,c,i,d}	{f,g,j,z}	0	3	5	4	5	7	6	8	11	12	(10)
9	{a,b,h,e,c,i,d,z}	{f,g,j}	0	3	5	4	5	7	6	8	(11)	12	10
10	{a,b,h,e,c,i,d,z,g}	{f,j}	0	3	5	4	5	7	6	8	11	12	10

shortest path : a → b → c → g which is 11

CamScanner

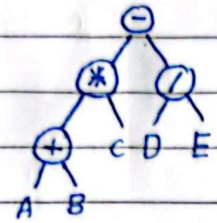
No.: ..... Date: .....

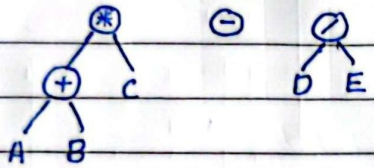
Q2

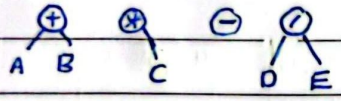
1) a is balanced as every leaves are at level 2 or level 1 (maximum height = 2)

b is balanced as every leaves are at level 3 or level 2 (maximum height = 3)

2)



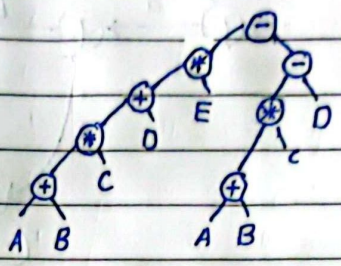




A ⊕ B ⊛ C ⊖ D ⊘ E

inorder traversal : A+B*C-D/E

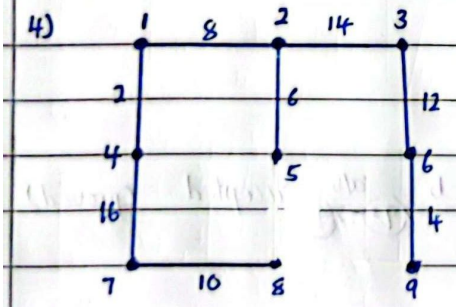
3)



prefix form : -*+**+ABCDE-*+ABCD

postfix form : AB+C*D+E*AB+C*D--

4)



MST = 2+4+6+8+10+12+14+16

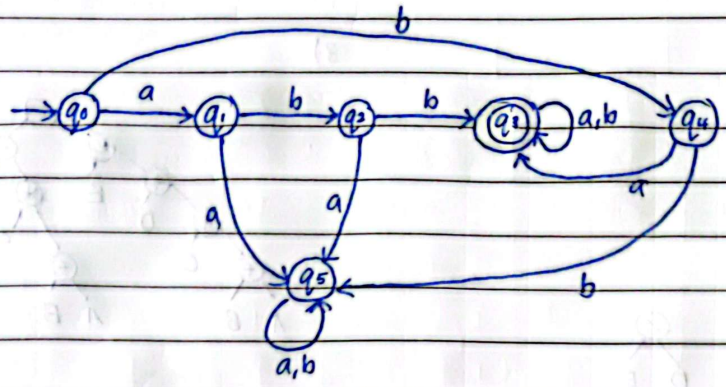
= 72

No.: Date:

Q3

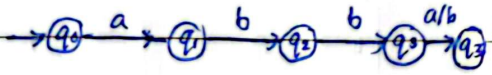
1) accept the strings over {a,b} , starting with either abb / ba

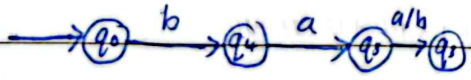
Let M = {{$q_0, q_1, q_2, q_3, q_4, q_5$}, {a,b}, q_0, fs, {q_3}}



Transition table :

fs	a	b
q_0	q_1	q_4
q_1	q_5	q_2
q_2	q_5	q_3
q_3	q_3	q_3
q_4	q_3	q_5
q_5	q_5	q_5

when starting from abb :  accepted (proved)

when starting from ba :  accepted (proved)

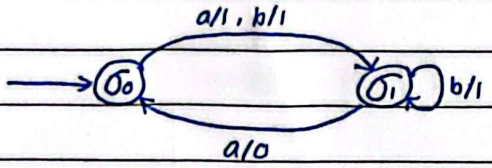
CamScanner

No.: ..... Date: .....

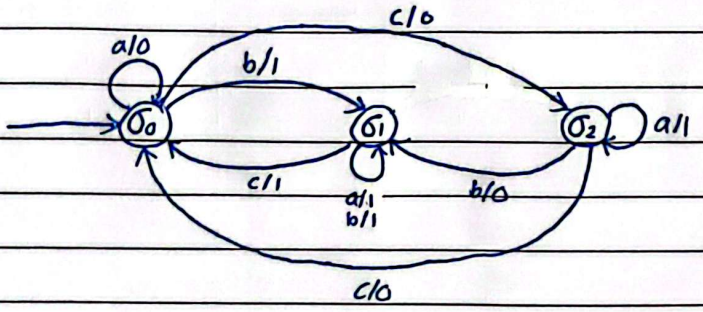
Q4

1) Finite-state machine (FSM) is a mathematical model of computation. Every state has an input and corresponding to the input and the state also has an output. It is a computational model that can be used to stimulate sequential logic.

2) a)



b)



3) $I = \{a, b\}$ $O = \{0, 1\}$ $S = \{\sigma_0, \sigma_1, \sigma_2, \sigma_3\}$ initial state $= \sigma_0$

	f_S		f_O	
S \ I	a	b	a	b
σ_0	σ_1	σ_2	0	0
σ_1	σ_0	σ_2	1	0
σ_2	σ_3	σ_0	0	1
σ_3	σ_1	σ_3	0	0

CamScanner