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SECI 1013 : DISCRETE STRUCTURE

ASSIGNMENT 4

SESSION 2024/2025 - SEMESTER I

SECTION 02

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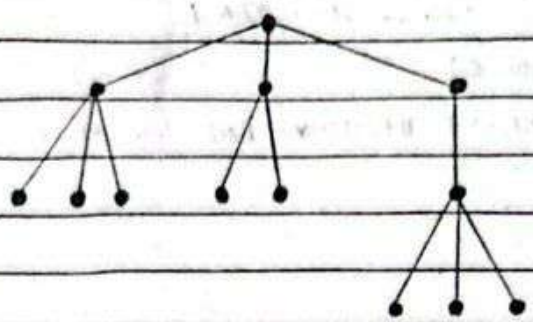
Question 1

a)



b) 13 vertices
12 edges

c) No, the tree is not a full 3-ary tree because the right-most child and the middle child do not each have exactly 3 children.

d) Yes, the tree is balanced because all leaves at levels 2 and 3

Question 2

a) The children of vertex d is h and i.

b) The sibling of vertex f is g.

c) The height of this rooted tree is 4.

d) 1-2-1

e) Preorder Traversal : a, b, d, h, n, o, i, e, j, k, c, f, l, m, g
Inorder Traversal : n, h, o, d, i, b, j, e, k, a, l, f, m, c, g
Postorder Traversal : n, o, h, i, d, j, k, e, b, l, m, f, g, c, a

Question 3

Listing Inorder :

2, +, 2, *, 3, +, 4, /, 2

Expression = 2 + 2 * 3 + 4 / 2

= 10

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Question 4

$m = 4$

$n = ?$

$l = ?$

$i = 2000$

$n = mi + 1$

$= 4(2000) + 1$

$= 8001$ have been recruited

$$i = \frac{l - 1}{m - 1}$$

$l = i(m - 1) + 1$

$= 2000(4 - 1) + 1$

$= 6001$ did not do any recruitment

5)

Edges	Weight	cycle (Y/N)	Select (Y/N)
CD	1	N	Y
DH	2	N	Y
EF	2	N	Y
AB	4	N	Y
FH	4	N	Y
DE	6	Y	N
CE	7	Y	N
FJ	7	N	Y
BF	8	N	Y
AC	8	Y	N
JI	9	N	Y
HI	10	Y	N
BC	11	Y	N
JH	14	Y	N

Total weight = 1+2+2+4+4+7+8+9

= 37

Total length = 37 m

Total cost = 37 × 100

= RM 3700

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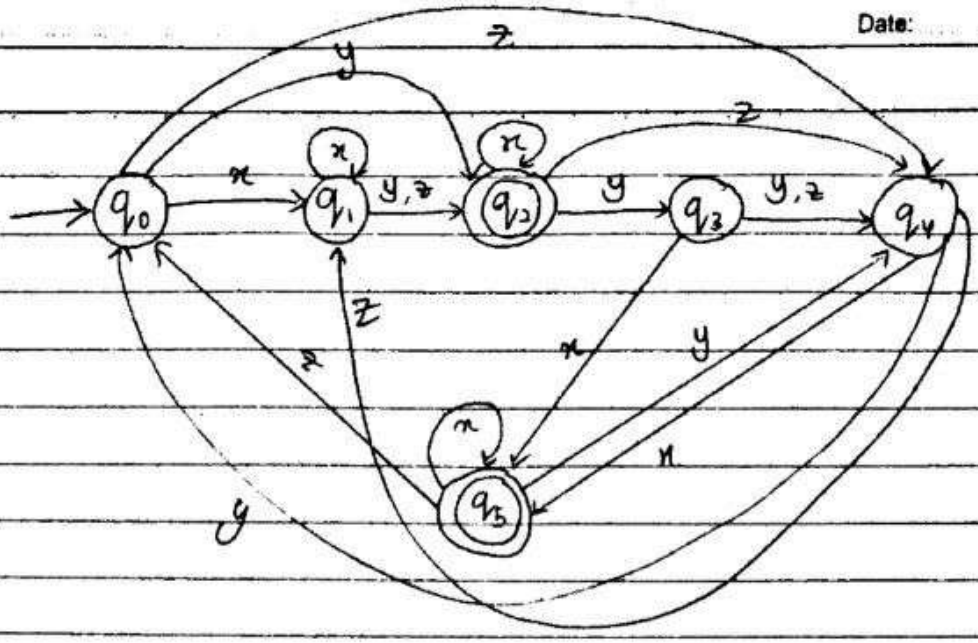
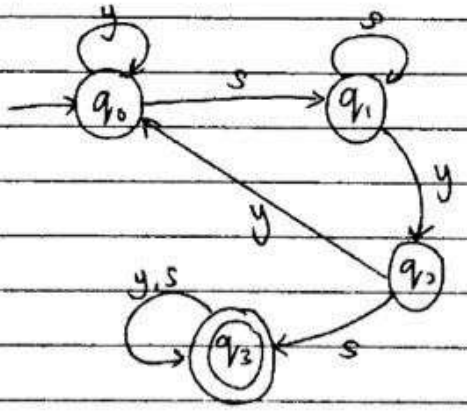
6. i)



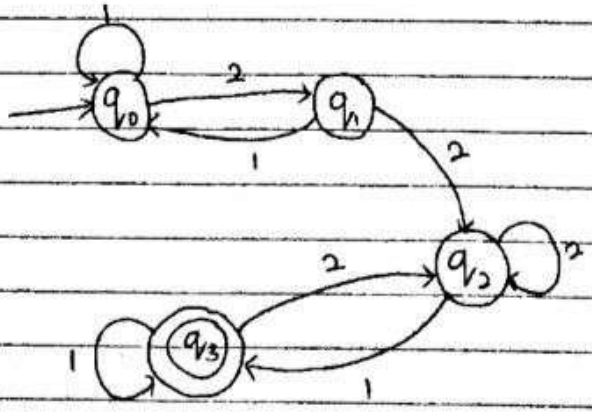
ii) minimum length of strings = 1

iii) $q_0 \xrightarrow{y} q_2$

7. i) string 'sys'



ii) contain 22, end in 1



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Question 8

a) $S = \{q_0, q_1, q_2, q_3\}$

$I = \{a, b\}$

$O = \{0, 1\}$

$q_0 = \{q_0\}$ = initial state

	f_S		f_O	
	a	b	a	b
q_0	q_1	q_3	1	0
q_1	q_1	q_2	0	1
q_2	q_1	q_2	0	1
q_3	q_3	q_3	1	0

b) $q_0 \xrightarrow[1]{a} q_1 \xrightarrow[0]{a} q_1 \xrightarrow[0]{a} q_1 \xrightarrow[1]{b} q_2 \xrightarrow[1]{b} q_2 \xrightarrow[1]{b} q_2$

output string : 100111

output : 1 , accepted

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Question 9

States:

q_1 = green light with barriers at top position

q_2 = yellow light with barriers lowering

q_3 = red lights with barriers at bottom position

q_4 = red light with barriers raising

Input:

A = no signal from any sensors

B = left sensor sends first signal

C = left sensor sends second signal

D = right sensor sends first signal

E = right sensor sends second signal

F = barriers not at top position

G = barrier not at bottom position

H = barrier at top position

I = barrier at bottom position

Output

0 = no change

1 = lowering barrier

2 = raising barrier