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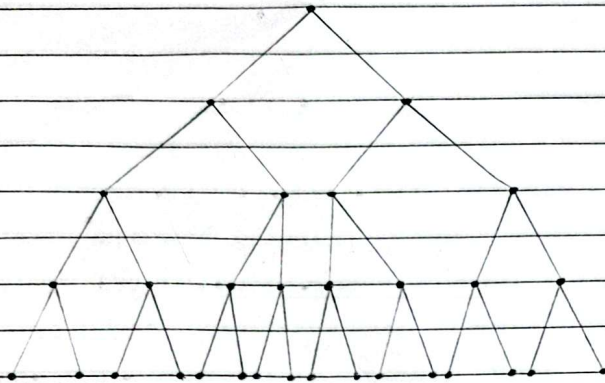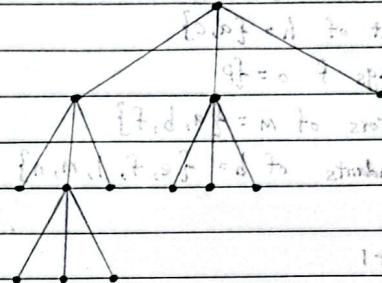No:....................................
Date:........ . ...

Assignment 4

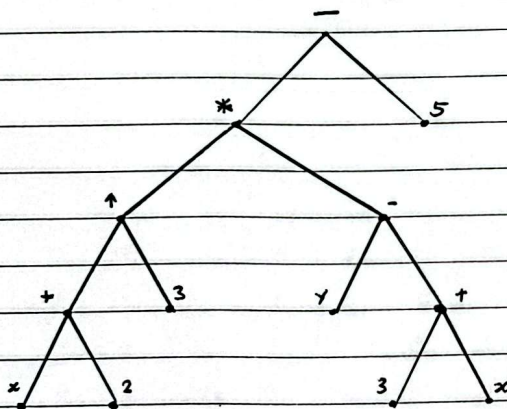1) b and c are trees. Both are connected undirected graph with no simple circuits

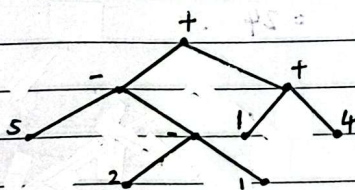2) Complete binary tree of height 4 :   full 3-ary tree of height 3 :

3)

Pre order: $-, *, \uparrow, +, \times, 2, 3, -, \curlyvee, +, 3, \times, 5$

In order: $\times, +, 2, \uparrow, 3, *, \curlyvee, -, 3, +, \times, -, 5$

Post order: $\times, 2, +, 3, \uparrow, \curlyvee, 3, \times, +, -, *, 5, -$

4)

$5-(2-1)+(1+4)$

$2-1 = 1$

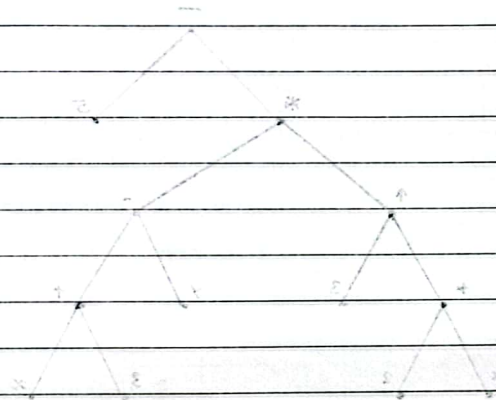$5-1 = 4$

$4+1+4 = 9$

$\therefore 9$

Subject:

5) a)   root = a

b) internal node = {a, b, c, d, f, h, j, z, t}

c) leaves = {e, l, m, n, g, o, p, i, k, s, r, u}

d) children of j = {q, r}

e) parent of h = c

f) siblings of o = p

g) ancestors of m = {a, b, f}

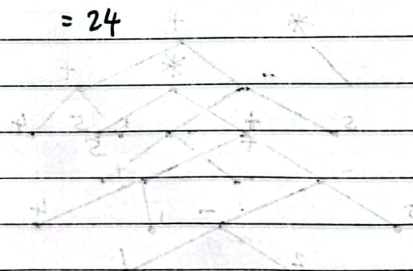h) descendants of b = {e, f, l, m, n}

6) $n = mi + 1$

= 5 (100) + 1

= 500 + 1

= 501   vertices

7) $l = \dfrac{(m-1)n + 1}{m}$

$= \dfrac{(4-1)1000 + 1}{4}$

$= \dfrac{3001}{4}$

= 750.25

8)   ad = 2   ~~ef = 5~~

eg = 2   ~~de = 6~~   Minimum   Spanning   Tree = 2 + 2 + 3 + 3 + 4 + 10

ab = 3   ~~be = 7~~   = 24

gf = 3   ac = 10
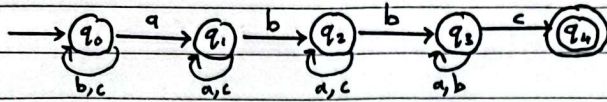
ae = 4

~~df = 4~~

9)   6 dollars.

The chain starts with one person, who sends letters to 6 people and receives one dollar from each, totaling 6 dollars. As the chain progresses, each person in turn sends letters to 6 others. Since no person breaks the chain and no one receives more than one letter, a person in the chain will ultimately receive 6 dollars.

10)

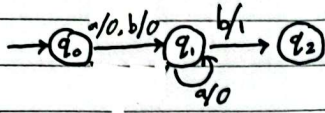States $q_0 \xrightarrow{a} q_1 \xrightarrow{b} q_2 \xrightarrow{b} q_3 \xrightarrow{c} q_4$ with self-loops b,c on q_0; a,c on q_1; a,c on q_2; a,b on q_3.

11) a)

$q_0 \xrightarrow{a/0, b/0} q_1 \xrightarrow{b/1} q_2$, self-loop $a/0$ on q_1.

b)

$q_0 \xrightarrow{b/1} q_1$, self-loop $a/0$ on q_0.

c)

$q_0 \xrightarrow{a/1} q_1 \xrightarrow{a/0} q_2 \xrightarrow{a/1} q_3$, with $b/0$, $b/1$, $b/0$ transitions.

12) a)
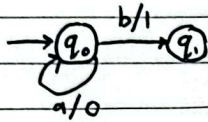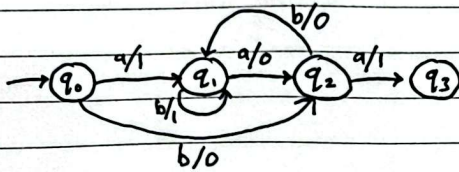
	f_s					f_o				
	i_1	i_2	i_3	i_4	i_5	i_1	i_2	i_3	i_4	i_5
q_0	q_1	q_0	q_0	q_0	q_0	0	0	0	0	0
q_1	q_2	q_0	q_1	q_1	q_1	0	0	0	0	0
q_2	q_2	q_0	q_3	q_2	q_2	1	1	1	1	1
q_3	q_3	q_3	q_4	q_3	q_3	2	2	2	2	2
q_4	q_4	q_4	q_4	q_0	q_4	3	3	3	3	3

b)

q_0: self-loop $i_2/0, i_3/0, i_4/0, i_5/0$; $q_0 \xrightarrow{i_1/0} q_1$

q_1: self-loop $i_3/0, i_4/0, i_5/0$; $q_1 \xrightarrow{i_2/0} q_0$; $q_1 \xrightarrow{i_1/0} q_2$

q_2: self-loop $i_1/1, i_4/1, i_5/1$; $q_2 \xrightarrow{i_2/1} q_0$; $q_2 \xrightarrow{i_3/1} q_3$

q_3: self-loop $i_1/2, i_2/2, i_4/2, i_5/2$; $q_3 \xrightarrow{i_3/2} q_4$

q_4: self-loop $i_1/3, i_2/3, i_3/3, i_5/3$; $q_4 \xrightarrow{i_4/3} q_0$