Date

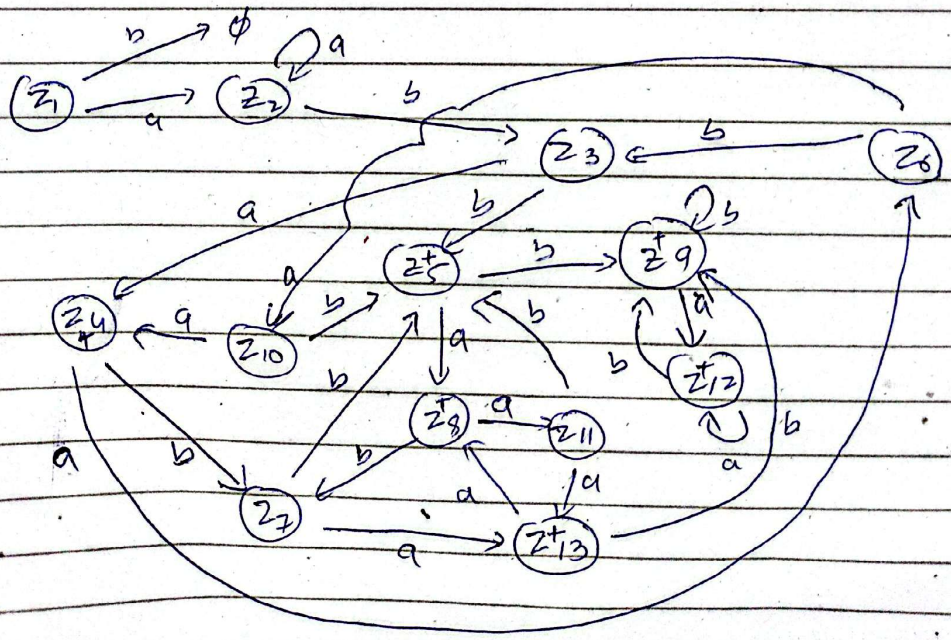
TOA Assign 2

BCS-4J 23K-0800

Q 1

1)

	a	b
$q_0 = z_1$	$q_1 = z_2$	ϕ
$q_1 = z_2$	$q_1 = z_7$	$q_2A = z_3$
$q_2A = z_3$	$q_1B = z_4$	$q_2AB = z_5$
+ $q_1B = z_4$	$q_1C = z_6$	$q_2AC = z_7$
+ $q_2AB = z_5$	$q_1BC = z_8$	$q_2ABC = z_9$
$q_1C = z_6$	$q_1A = z_{10}$	$q_2A = z_3$
$q_2AC = z_7$	$q_1AB = z_{13}$	$q_2AB = z_5$
+ $q_1BC = z_8$	$q_1AC = z_{11}$	$q_2AC = z_7$
+ $q_2ABC = z_9$	$q_1ABC = z_{12}$	$q_2ABC = z_9$
$q_1A = z_{10}$	$q_1B = z_4$	$q_2AB = z_5$
$q_1AC = z_{11}$	$q_1AB = z_{13}$	$q_2AB = z_5$
+ $q_1ABC = z_{12}$	$q_1ABC = z_{12}$	$q_2ABC = z_9$
+ $q_1AB = z_{13}$	$q_1BC = z_8$	$q_2ABC = z_9$



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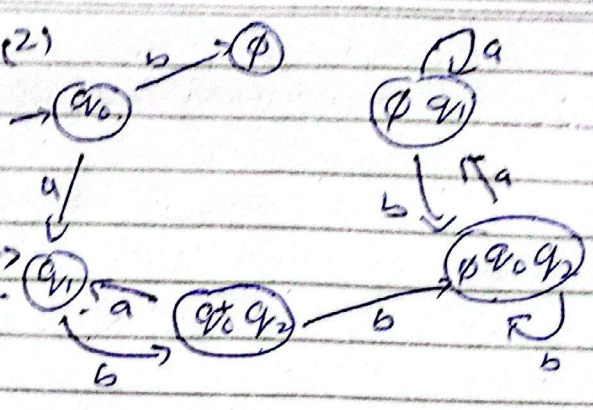
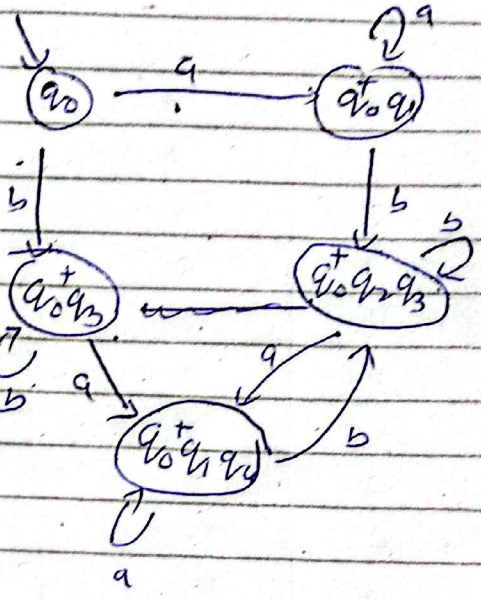
	a	b
$\to q_0$	q_1	ϕ
q_1	q_1	$q_2 q_3$
$+q_2 q_3$	q_1	$\phi q_0 q_2$
$+q_2 \phi q_0$	ϕq_1	$\phi q_0 q_2$
ϕq_1	ϕq_1	$\phi q_0 q_2$

(2)



(3)

	a	b
$\to q_0$	$q_0 q_1$	$q_0 q_3$
$+ q_0 q_1$	$q_0 q_1$	$q_0 q_2 q_3$
$+ q_0 q_3$	$q_0 q_1 q_4$	$q_0 q_3$
$+ q_0 q_2 q_3$	$q_0 q_1 q_4$	$q_0 q_2 q_3$
$+ q_0 q_1 q_2$	$q_0 q_1 q_4$	$q_0 q_2 q_3$



Question 2

(i)

$L = \{ 0, 00, 000, 0001, \epsilon, \ldots \}$

$= 00001 \quad x = 00, \; y = 0, \; z = 01$

$i = 1 \Rightarrow 00001$

$i = 2 \Rightarrow 000001 \neq L$, Hence Not regular

(ii)

$L = \{ 01110, 0111001110 \ldots \}$.

01110 if $i = 2 \Rightarrow 0111110 \neq L$

x y z

Not regular

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(iii)

$L_1 = \{abc, aabbc, aaabc \cdots\}$

abc $x = a$, $y = b$, $z = c$

$i = 2 \Rightarrow abbc$ ∴ Not in L

Not in regular

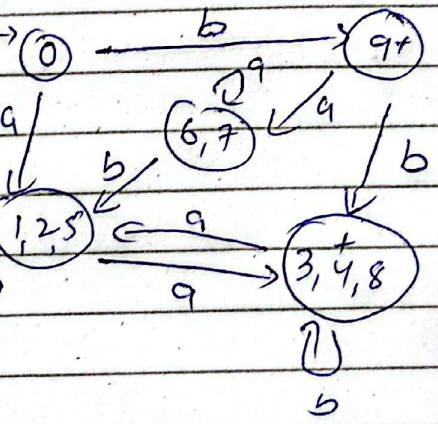
Question 3

	a	b
0	1	9
1	8	2
2	3	2
* 3	9	4
* 4	5	8
5	4	5
6	7	5
7	6	5
II * 8	1	3
II * 9	7	8

= {0,1,2,5,6,7} {3,4,8,9}

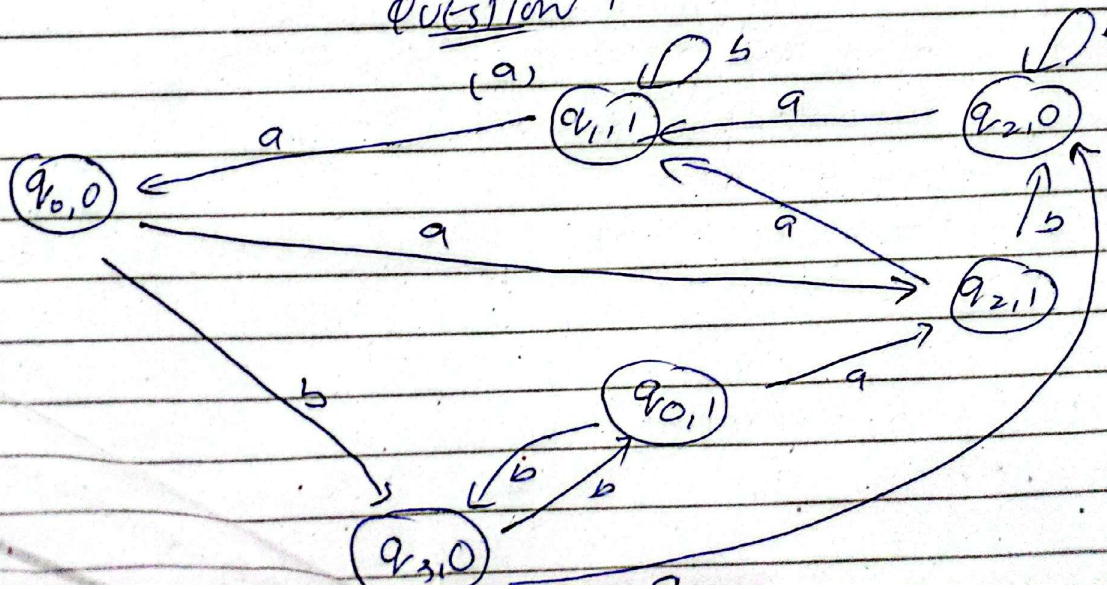
= {0} {1,2,5} {6,7} {3,4,8,9}

= {0} {1,2,5} {6,7} {9} {3,4,8}



(a)

Question 4



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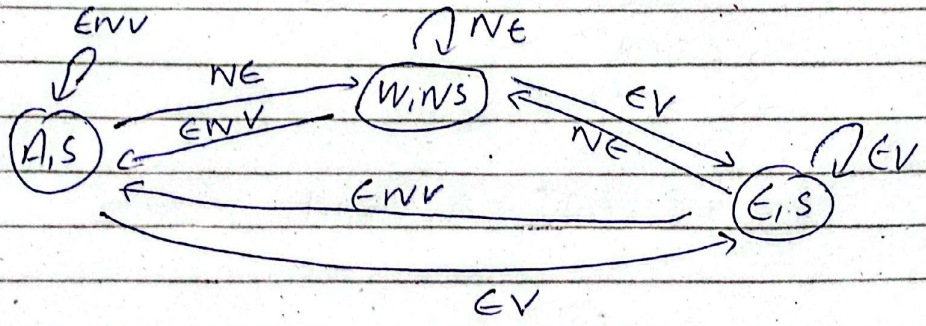
(b)

States	NE	EV	ENV
E	W/NS	E/S	A/S
A	W/NS	E/S	A/S
W	W/NS	E/S	A/S



QUESTION 5

(a)

V = {S, A, B, C, D, E} $V = \{q_0, q_1, q_2, q_3, q_4\}$

$\Sigma = \{a, b, c\}$ $S = q_0$,

final state = $\{q_2, q_3\}$.

δ	a	b	c
$A = q_0$	q_1	q_1	q_4
$B = q_1$	q_2	q_0	q_3
$C = q_2$	q_3	q_4	q_2
$D = q_3$	q_3	q_2	q_1
$E = q_4$	q_2	q_4	q_3

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A = aB | bB | cC

B → aC | a | bA | cC | c

C = aD | a | bG | cC | c

D = aD | a | bC | bB | cB

E = aC | a | bE | cA

(b)

best => $a(a+b)^* + ba^*b + \lambda$

=> $(a+b)^*$

=> a^*b

RE = $a(a+b)^* + ba^*b + \lambda$ Ans

(c)

RG: S → aSc | b

(d)

(i)

A → aA generates any number of a's

recursive

A → ε stop at any number, or empty string

Hence it generates all string of a^*.

L = { ε, a, aa, aaa, ... }

(ii)

L_1 = S_1 → aS_1 | bS_1 | a

L_2 = S_2 → bS_2 | aS_2 | b

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RG:

$S \rightarrow S_1$

$S_1 \rightarrow aS_1 \mid bS_1 \mid aS_2$

$S_2 \rightarrow bS_2 \mid aS_2 \mid b$

(iii)

Left-linear grammar can be converted to a right-linear grammar (and vice versa) using FA of string reversal.

Hence, it is true that a language defined by left-linear is regular.