

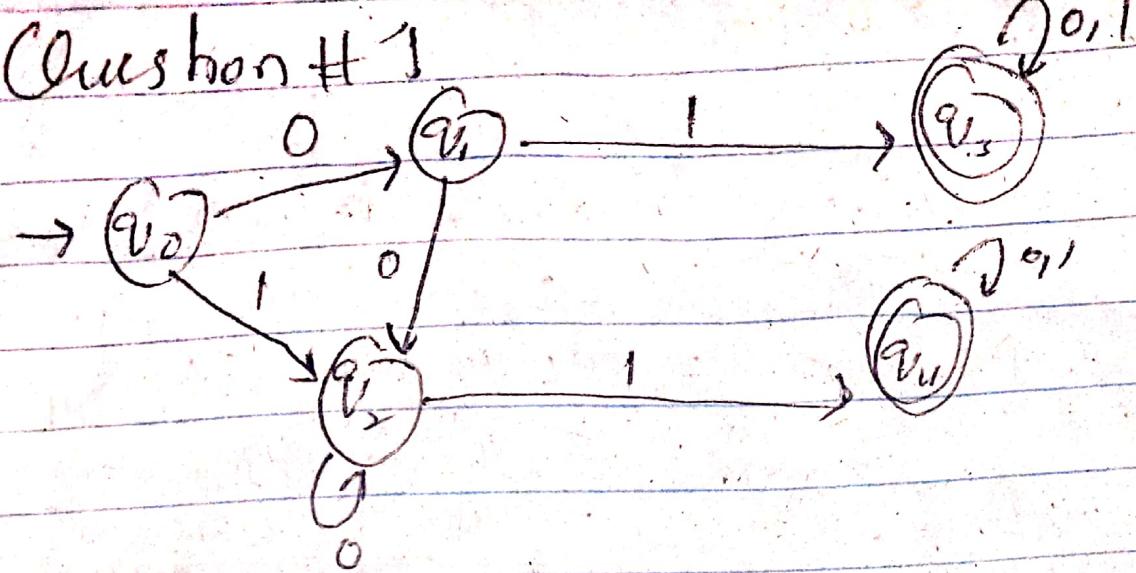
# Home Task #5

Name

Muzamal

TOA

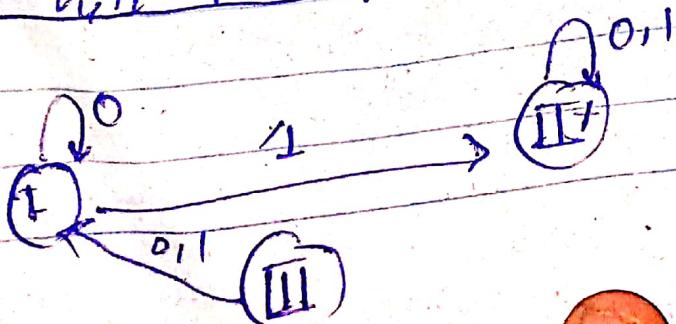
# Question #1



Solution

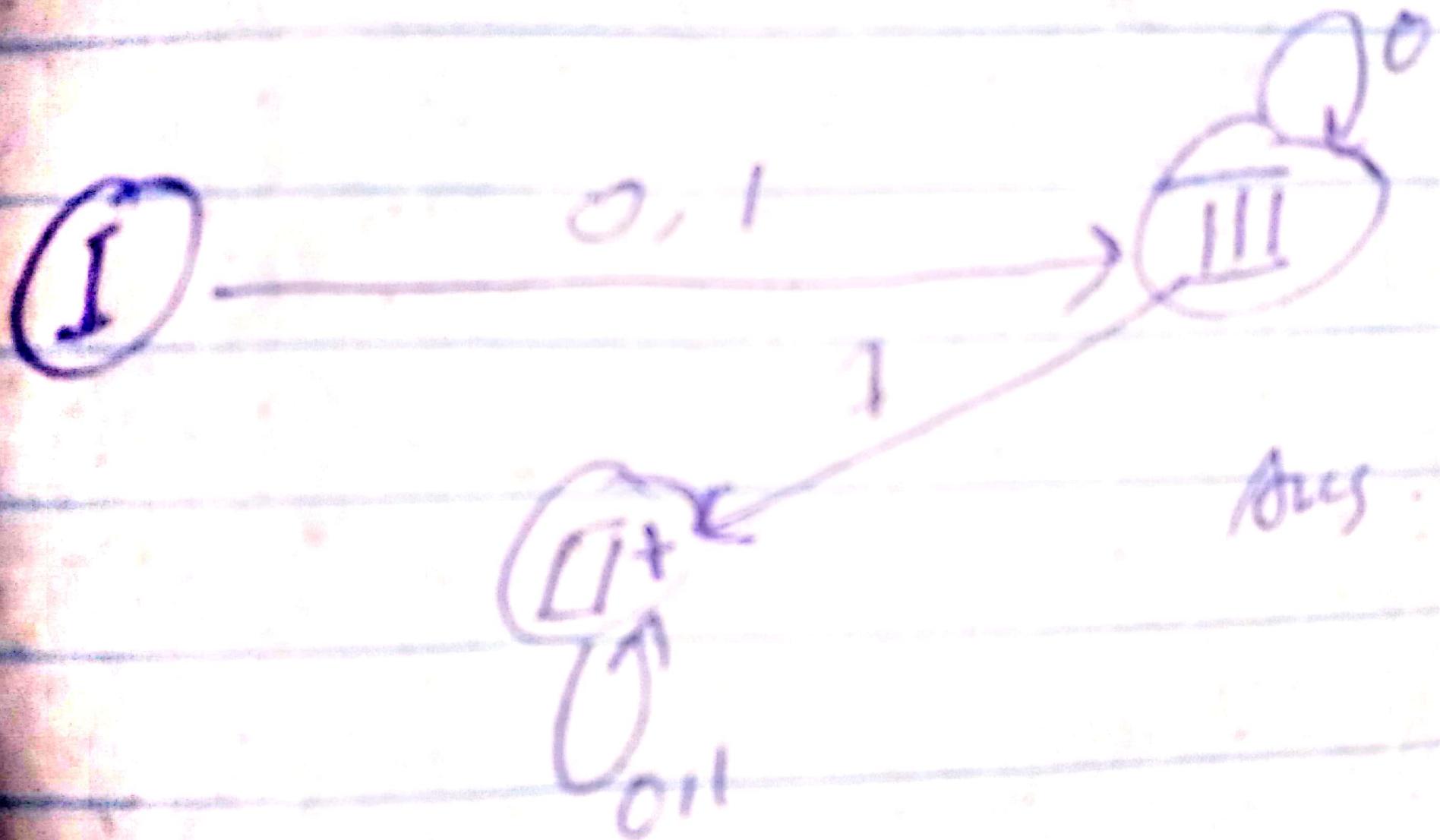
Q		I
$q_0$ I	$q_1$ I	$q_2$ I
$q_1$ I	$q_2$ I	$q_3$ II
$q_2$ I	$q_3$ I	$q_4$ II
$q_3$ I	$q_3$ II	$q_3$ II
$q_4$ I	$q_4$ II	$q_4$ II

O			I	O			I
III	$q_0$ III	$q_1$ I	$q_2$ I	I	II	I	II
	$q_1$ I	$q_2$ I	$q_3$ II	II	II	II	II
	$q_2$ I	$q_3$ I	$q_4$ II	II	I	I	I
II	$q_3$ II	$q_3$ II	$q_3$ II	II	II	II	II
	$q_4$ II	$q_4$ II	$q_4$ II	I	I	I	I



# Question #2

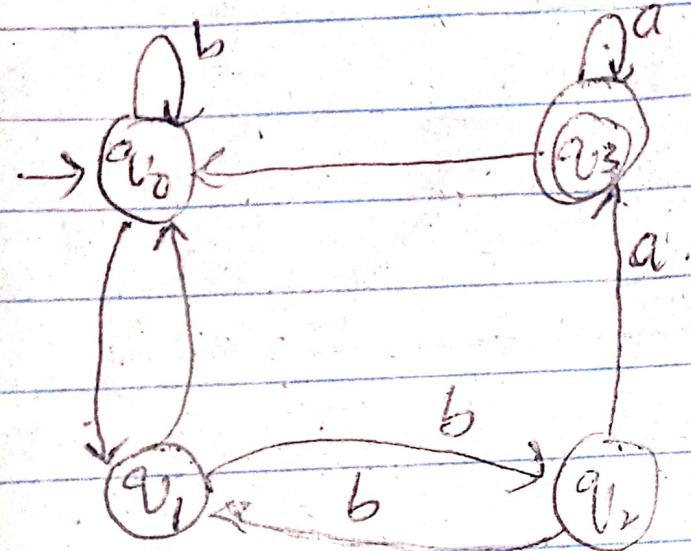
	0	1		0	1
$\Gamma q_0$	$q_1 \text{ I}$	$q_3 \text{ I}\bar{A}$	$\Gamma$	$q_1 \text{ III}$	$q_3 \text{ I}\bar{B}$
$\Gamma q_1$	$q_2 \text{ I}$	$q_4 \text{ II}$	$q_4 \text{ II}$	$q_2 \text{ III}$	$q_4 \text{ III}$
$\Gamma q_2$	$q_1 \text{ I}$	$q_4 \text{ I}$	$q_4 \text{ I}$	$q_1 \text{ II}$	$q_4 \text{ II}$
$\Gamma q_3$	$q_2 \text{ I}$	$q_4 \text{ II}$	$q_4 \text{ II}$	$q_2 \text{ III}$	$q_4 \text{ III}$
$\Gamma q_4$	$q_3 \text{ II}$	$q_4 \text{ II}$	$q_4 \text{ II}$	$q_3 \text{ III}$	$q_4 \text{ III}$
	0	1		0	1
$q_0 \text{ I}\bar{B}$	$q_1 \text{ III}$	$q_3 \text{ I}\bar{II}$	$\Gamma$	$q_1 \text{ I}\bar{I}$	$q_3 \text{ I}\bar{II}$
$q_1 \text{ III}$	$q_2 \text{ III}$	$q_4 \text{ I}\bar{A}$	$\Gamma$	$q_2 \text{ II}$	$q_4 \text{ II}$
$q_2 \text{ III}$	$q_1 \text{ III}$	$q_4 \text{ II}$	$\Gamma$	$q_3 \text{ III}$	$q_4 \text{ II}$
$q_3 \text{ III}$	$q_2 \text{ II}$	$q_4 \text{ II}$	$\Gamma$	$q_3 \text{ II}$	$q_4 \text{ II}$
$q_4 \text{ II}$	$q_3 \text{ II}$	$q_4 \text{ II}$	$\Gamma$	$q_3 \text{ II}$	$q_4 \text{ II}$



Aug 2018

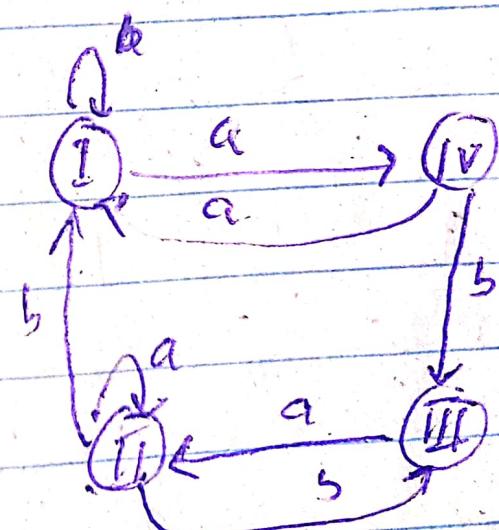
P20-0108

Question 3



a	b	a	b
$v_0, \text{I}$	$v_1, \text{IV}$	$v_1, \text{IV}$	$v_0, \text{I}$
$v_1, \text{V}$	$v_0, \text{V}$	$v_0, \text{V}$	$v_2, \text{III}$
$v_2, \text{III}$	$v_3, \text{II}$	$v_3, \text{II}$	$v_3, \text{II}$
$v_3, \text{I}$	$v_0, \text{I}$	$v_0, \text{I}$	$v_0, \text{I}$

a	b	a	b
$v_0, \text{V}$	$v_1, \text{I}$	$v_0, \text{I}$	$v_1, \text{I}$
$v_1, \text{I}$	$v_0, \text{I}$	$v_2, \text{I}$	$v_3, \text{I}$
$v_2, \text{I}$	$v_3, \text{II}$	$v_3, \text{II}$	$v_2, \text{II}$
$v_3, \text{II}$	$v_2, \text{II}$	$v_0, \text{I}$	$v_1, \text{I}$



a	b	a	b
$v_0, \text{I}$	$v_1, \text{I}$	$v_0, \text{I}$	$v_1, \text{I}$
$v_1, \text{IV}$	$v_0, \text{I}$	$v_2, \text{II}$	$v_3, \text{II}$
$v_2, \text{III}$	$v_3, \text{II}$	$v_1, \text{I}$	$v_2, \text{II}$
$v_3, \text{II}$	$v_2, \text{II}$	$v_0, \text{I}$	$v_1, \text{I}$

minimized DFA

a, b

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P20-0108

(Ans)

## Mealy & moore machine

Question #1

Design a moore machine which read sequence made up of letters a, e, i, o, u as output same character except when and only if followed by e

Soln:

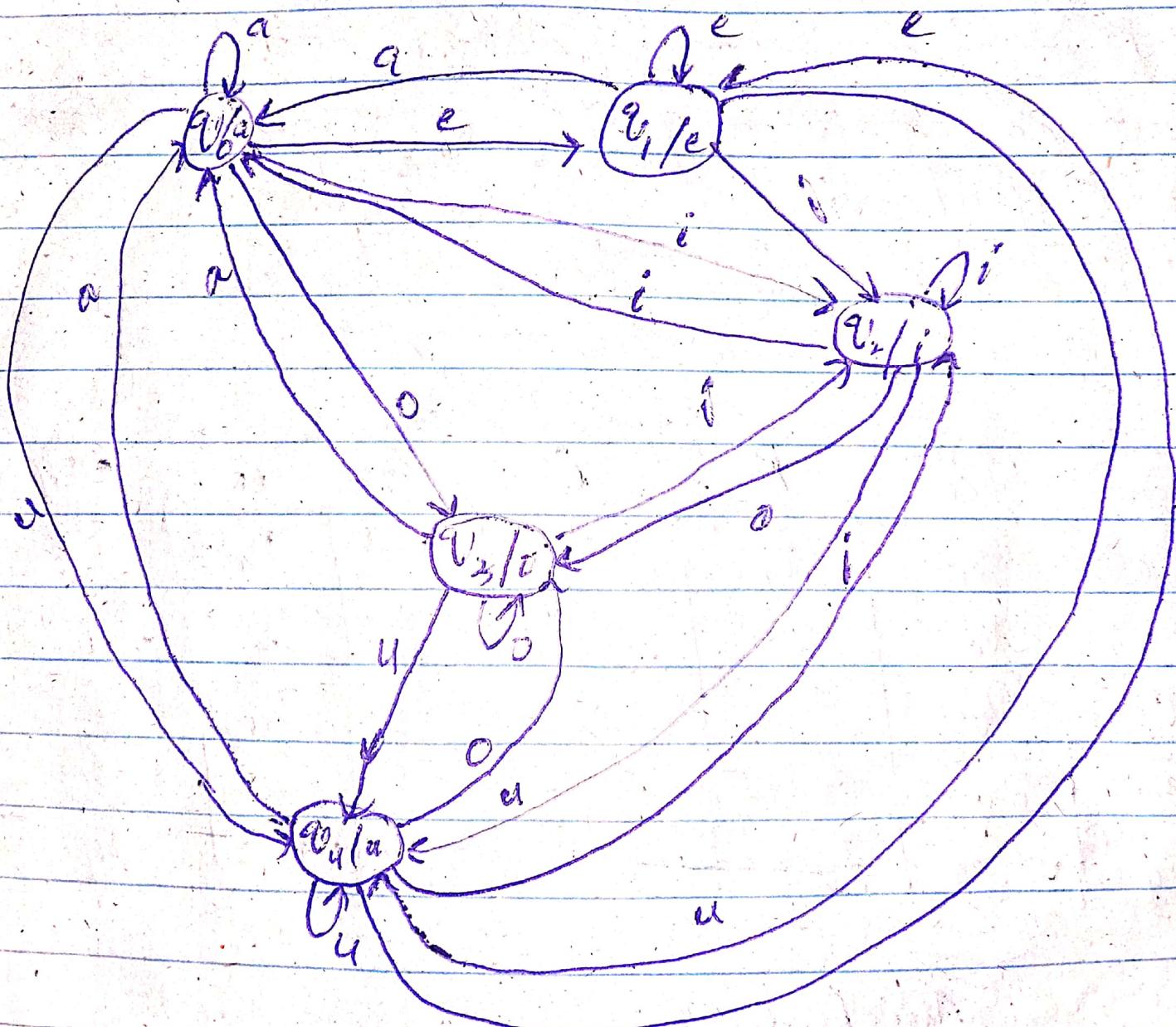
	a	e	i	o	u	output
$q_0$	$q_0$	$q_1$	$q_2$	$q_3$	$q_4$	a
$q_1$	$q_0$	$q_1$	$q_2$	$q_3$	$q_4$	i
$q_2$	$q_0$	$q_4$	$q_2$	$q_3$	$q_4$	e
$q_3$	$q_0$	$q_1$	$q_2$	$q_1$	$q_4$	o
$q_4$	$q_0$	$q_1$	$q_2$	$q_3$	$q_4$	y

nn m-mm-n

P20 - 0108

Primary

## Moore Machine

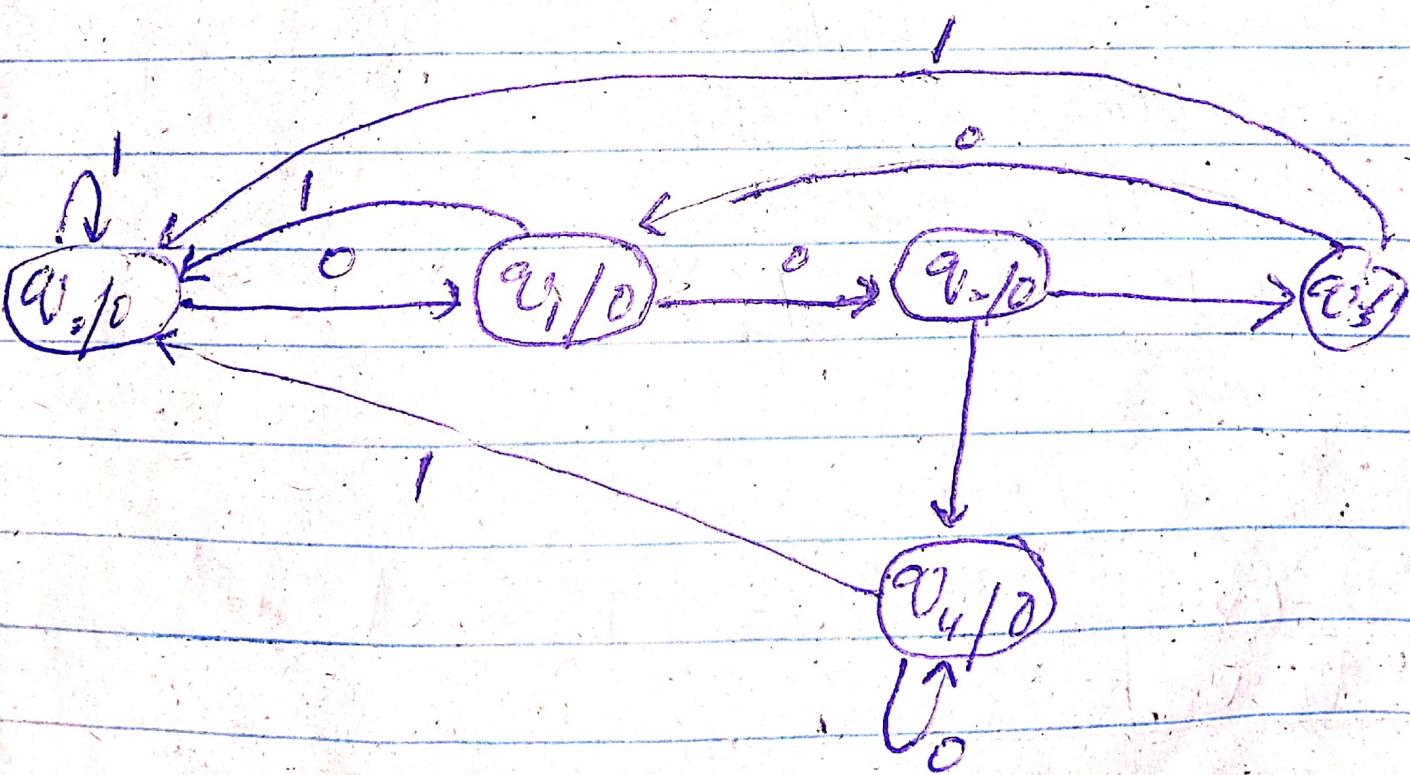


Question # 2

Design a Moore Machine that gives  
an output "1" if output of binary  
"1" is produced exactly by  
two zeros

e.g.: 001  $\Rightarrow$  output 01

0001  $\Rightarrow$  output 11



Question # 5  
Construct transition table  
Transition table

	0	1	2	<del>0,1,2</del>
$q_0$	$q_0$	$q_1$	$q_2$	0
$q_1$	$q_3$	$q_4$	$q_0$	1
$q_2$	$q_1$	$q_2$	$q_3$	2
$q_3$	$q_4$	$q_0$	$q_1$	3
$q_4$	$q_2$	$q_3$	$q_4$	4

Question # 6  
F.T. of mealy machine

	0	1
$q_0$	$q_0 / C$	$q_1 / C$
$q_1$	$q_2 / C$	$q_4 / K$
$q_2$	$q_0 / C$	$q_3 / C$
$q_3$	$q_2 / C$	$q_4 / C$
$q_4$	$q_5 / R$	$q_4 / C$
$q_5$	$q_0 / C$	$q_3 / A$

# Pumping Lemma

Question 1)

$s = a^n b a^n \in L$

So,

Assume ~~L~~ L is Regular

pumping length > p

$s = a^p b a^p$

$x \quad y \quad z$

Set  $p = 3$

$s = \underline{aaa} b \underline{aaa}$

$x \quad y \quad z$

2nd step prove  $xy^iz$

$s = aaa (ab) aaa$

$s = aaa ab ab aaa \notin L$  So, L is  
not Regular.

9)  $a^n b^n c^n d^{2n}$   $n > 0$

Soln: Assume L is Regular

L = {abidd, aabbccdddd, ...}

S<sub>r</sub>  $a^p b^p c^p d^{2p}$

p = 2

S<sub>r</sub> aa bb cc dddd

Now 'y' is in band C

aa bbcc dddd  
a v z

$\Rightarrow xyz$

S<sub>r</sub> aa (bbcc)<sup>2</sup> dddd  
L = aa bbcc bbcc dddd  $\notin$  L  
Hence Not regular

Question 4  
L = {a<sup>n</sup>b<sup>n</sup>}

Step 1  
Assume L is Regular  
Pumping length is P

S = a<sup>P</sup>b<sup>P</sup>

∴ P = 7 case I :-

⇒ S = aaaaaaaabbbbbbbbb  
x y z

case II - Case II & III is in b part

aaaaaaabbbbbbbbb  
x y z

Case III : if i is in a and b

aaaaaaabbbbbbbbb  
x y z

Case I

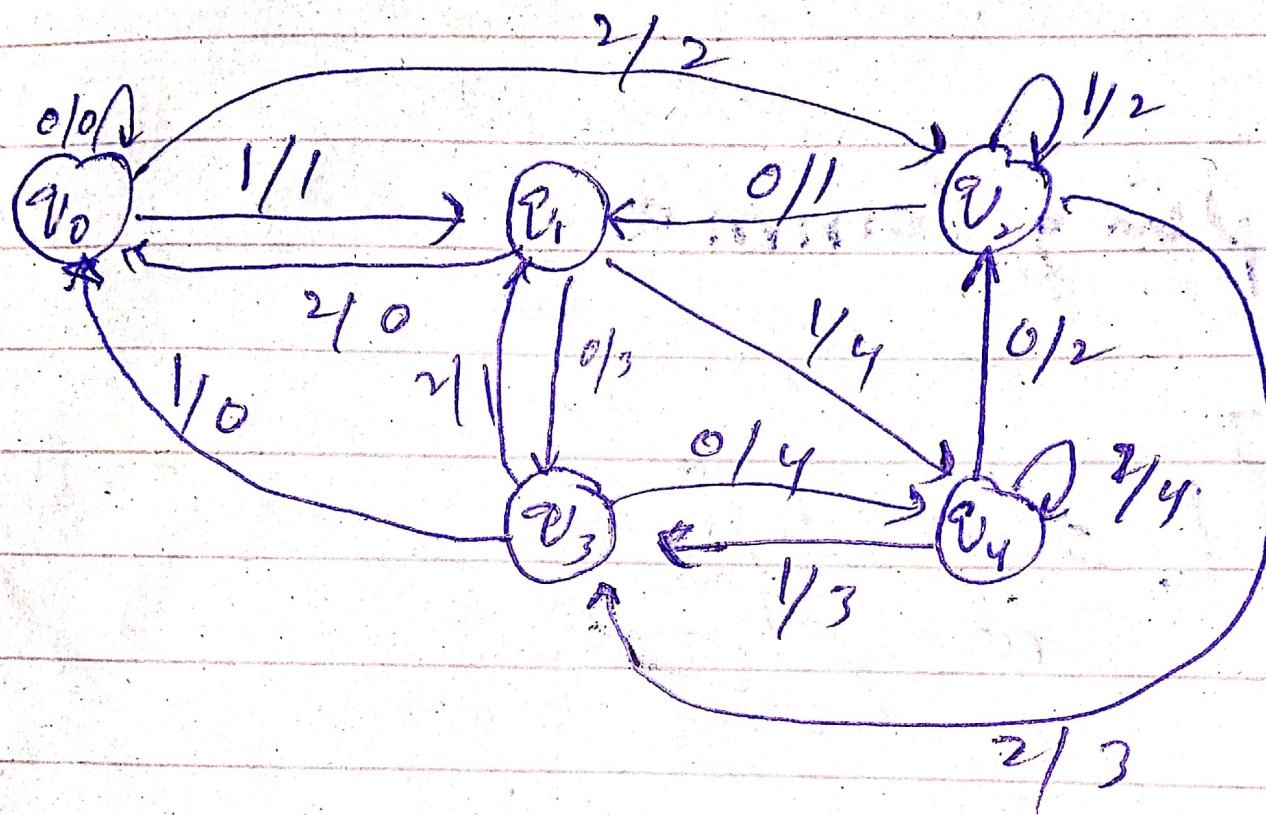
X Y<sup>i</sup> Z

aa aaaa aaaa abbbbbbbb & 1

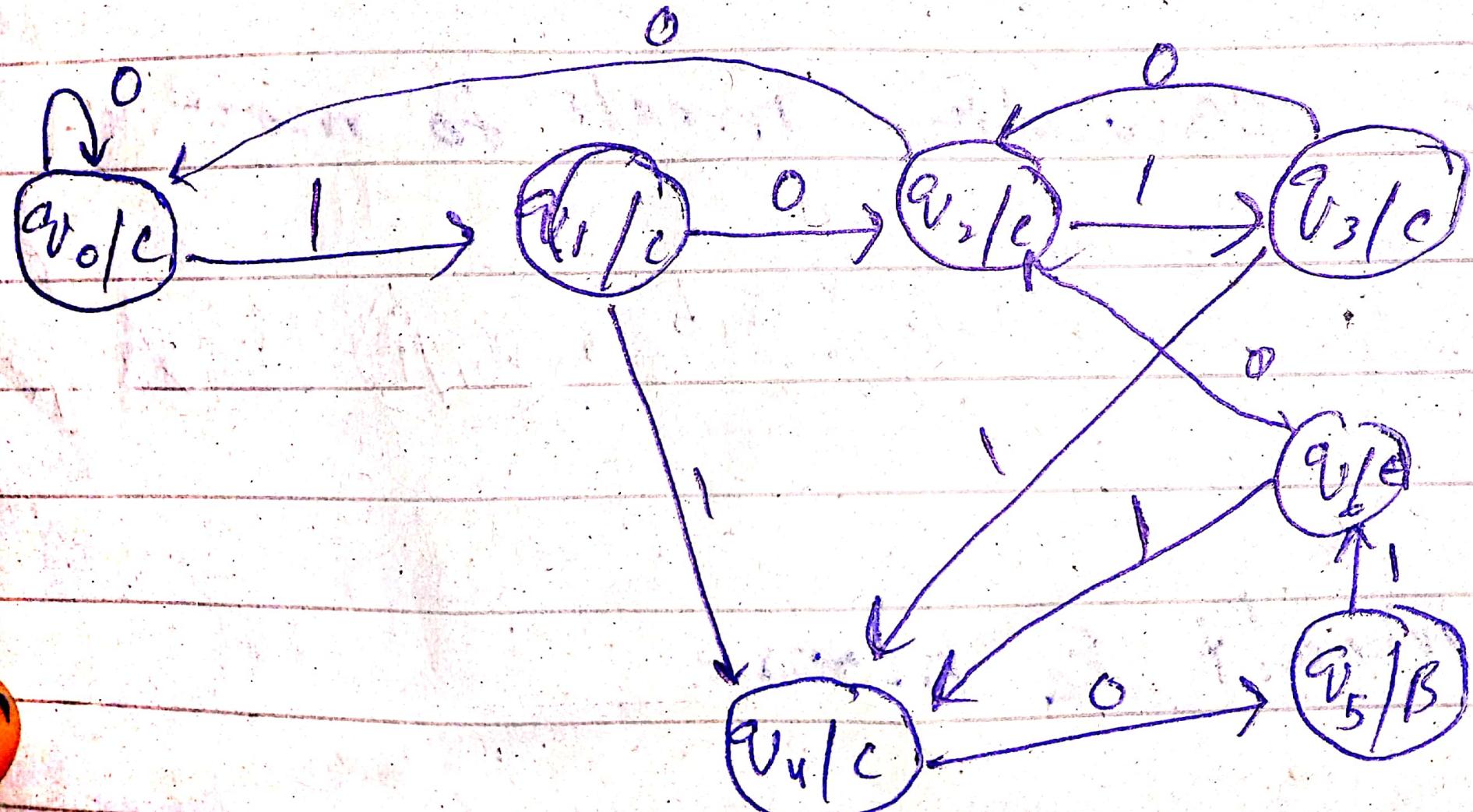
No of a's ≠ No of b's

# Mealy & moore

Q# 3



## Question #4



# Pumping lemma

Cl# 3

$$L = a(b)^*a$$

or

$$w = aba, \in L$$

$$aba \in L$$

xyz

As  $L$  is Slarick so,  $aab \in L$   
and @Condition of pumping  
 $|y| > 0$  is not true so  
 $L$  is not regular