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ASSIGNMENT 2

AT

Page No. :

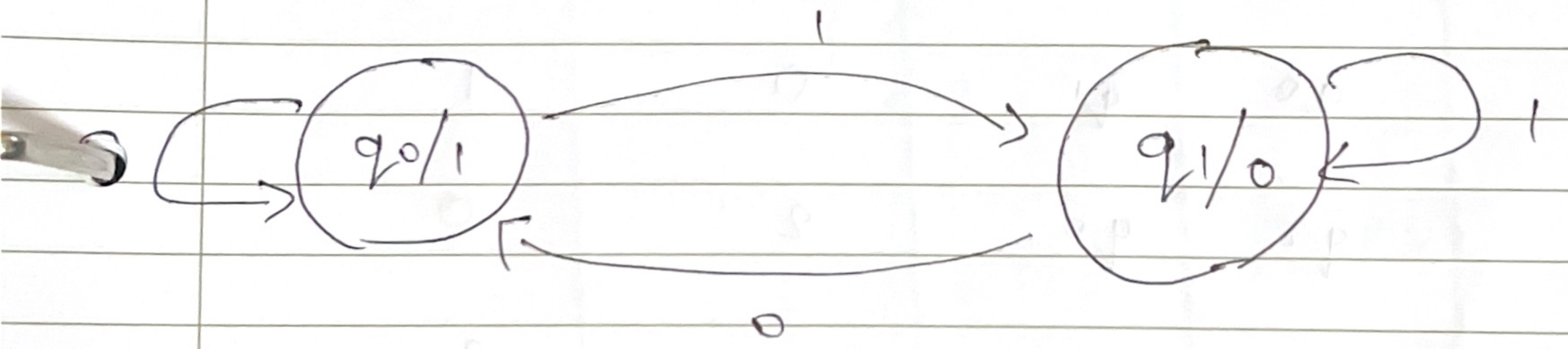
Date :

(1) A "MOORE" MACHINE IS A TYPE OF FINITE STATE MACHINE (FSM) WHERE OUTPUTS DEPEND ONLY ON CURRENT STATE NOT THE INPUT.

$M = (Q, \Sigma, \Delta, \delta, \lambda, q_0)$

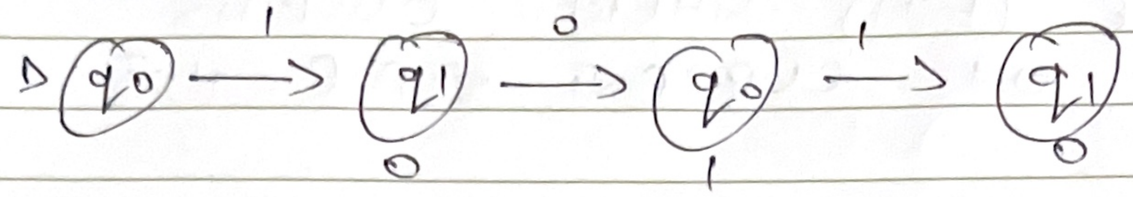
$Q \Rightarrow$ SET OF STATES
$\Sigma \Rightarrow$ SET OF INPUTS
$\Delta \Rightarrow$ SET OF OUTPUTS
$q_0 \Rightarrow$ INITIAL STATE
$\lambda \Rightarrow$ OUTPUT OF EACH STATE
$\delta \Rightarrow$ STATE TRANSITION

(2) 1'S COMPLIMENT OF A BINARY NUMBER, $\Sigma = \{0, 1\}$



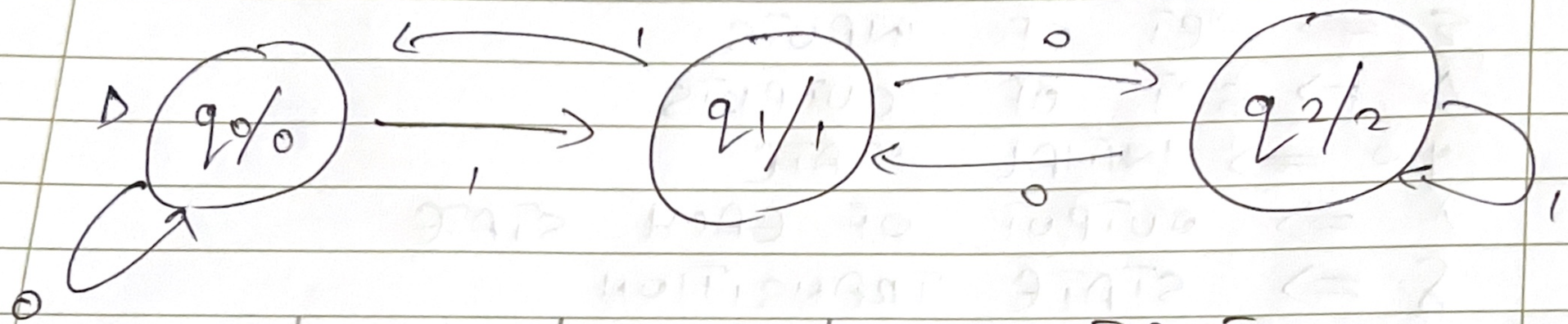
	OUTPUT	
0	1	0
1	1	1
0	0	1
1	0	0

INPUT : 101



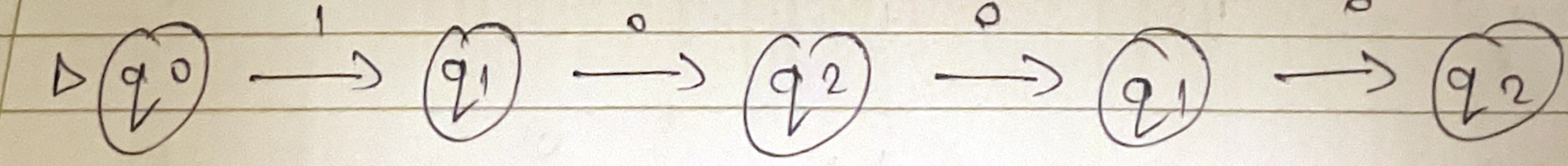
O/P ⇒ 010

(3) BINARY NUMBER DIMISIBLE BY 3



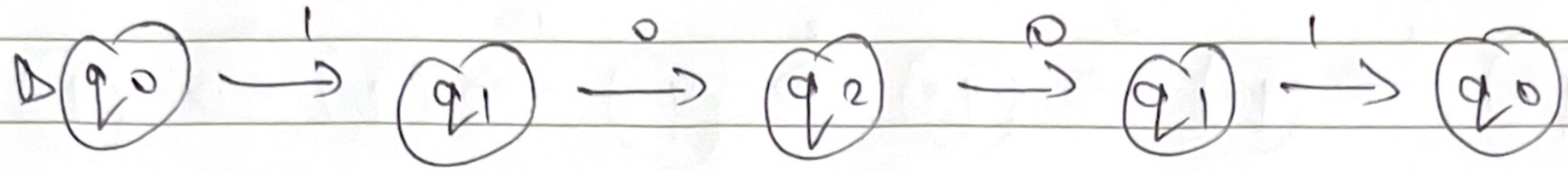
	0	1	OUTPUT 0	OUTPUT 1
q^0	q^0	q^1	0	1
q^1	q^2	q^0	2	0
q^2	q^1	q^2	1	2

— I/N ⇒ 1000



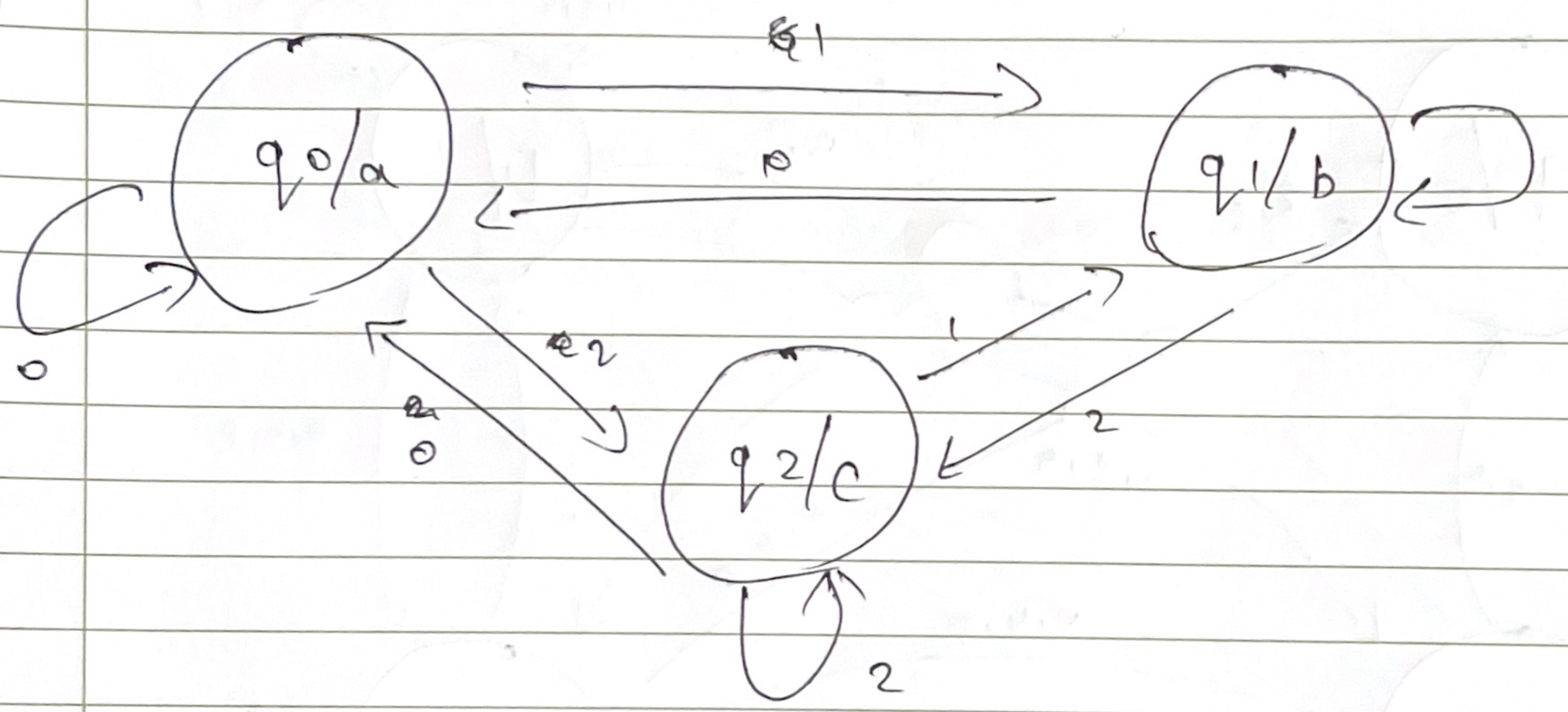
O/P ⇒ 2 , NOT DIVISIBLE

— I/N ⟹ 1001



O/P ⟹ 0, DIVISIBLE

(4) TRANSLATE $\Sigma = \{0,1,2\}$ TO $\{a,b,c\}$



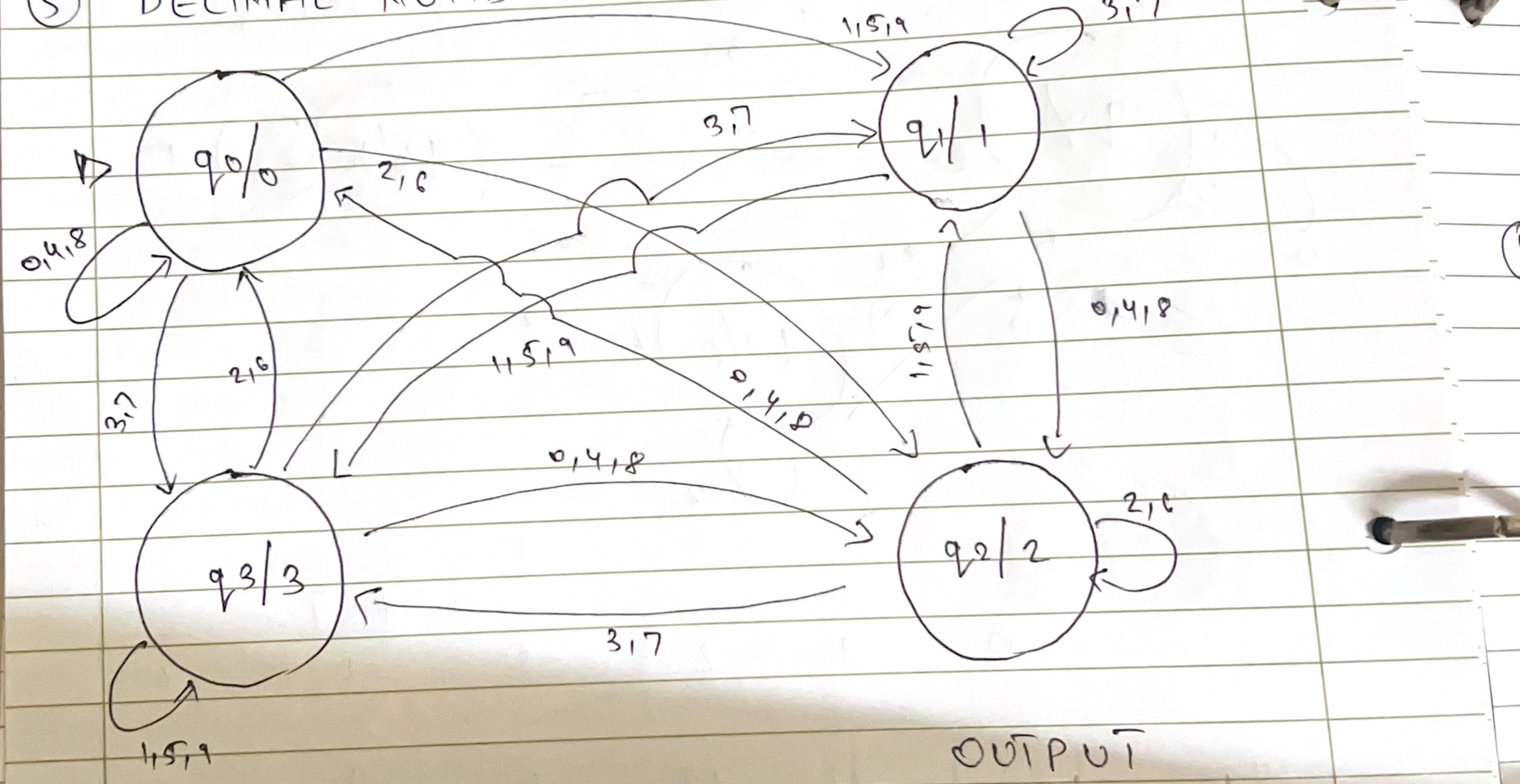
		OUTPUT				
	0	1	2	0	1	2
q_0	q_0	q_1	q_2	a	b	c
q_1	q_0	q_1	q_2	a	b	c
q_2	q_0	q_2	q_2	a	b	c

— I/N ⇒ 1 0 2 1 0

▷ q0 —1→ q1 —0→ q0 —2→ q2 —1→ q1 —0→ q2

O/P ⇒ b a c b a

(5) DECIMAL NUMBER DIMISIBLE BY 4



OUTPUT

	0,4,8	1,5,9	2,6	3,7	0,4,8	1,5,9	2,6	3,7
q0	q0	q1	q2	q3	0	1	2	3
q1	q2	q3	q0	q1	2	3	0	1
q2	q0	q1	q2	q3	0	1	2	3
q3	q2	q3	q0	q1	2	3	0	1

— I/N => 48

▷ (q0) —4→ (q0) —8→ (q0)

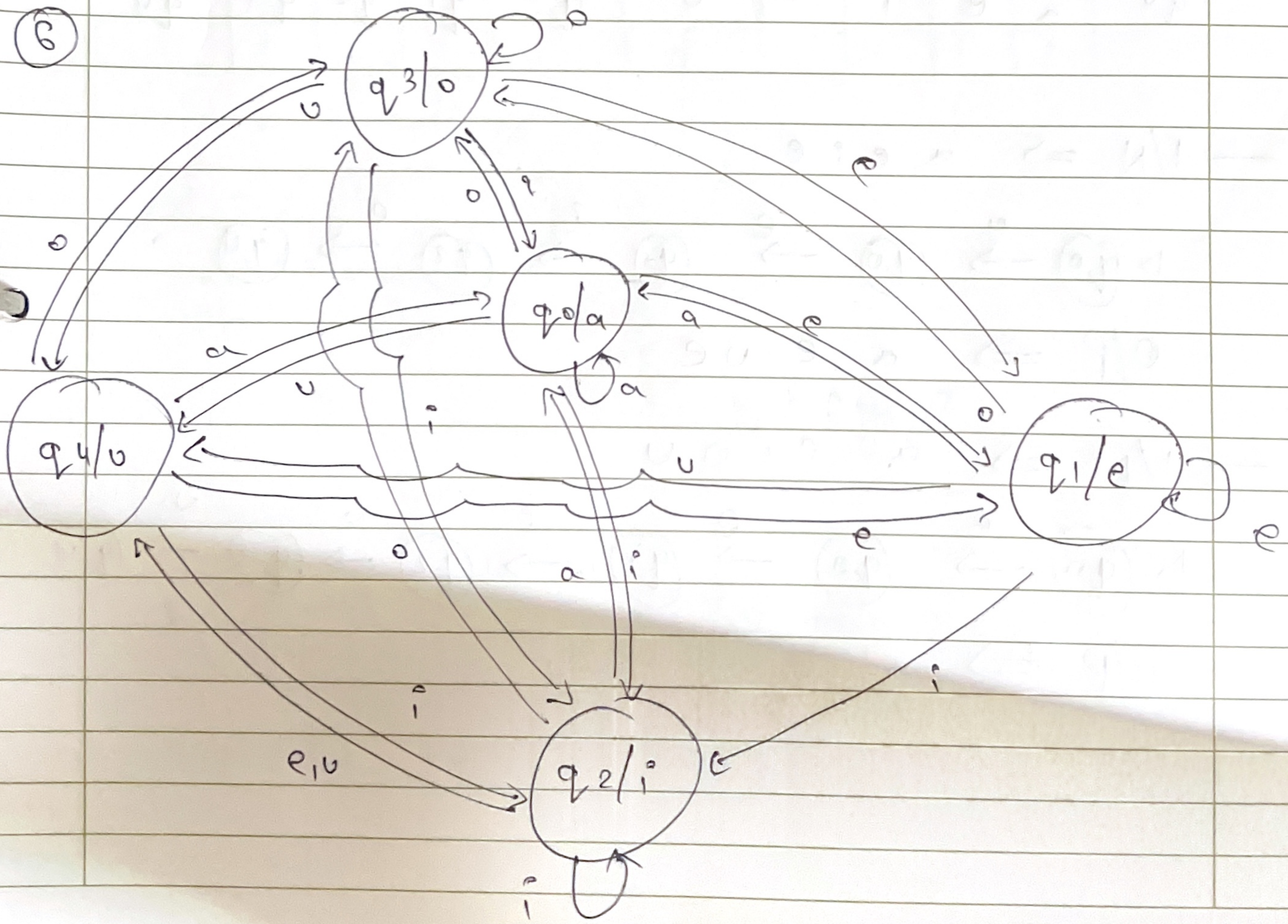
O/P => 00 , DIVISIBLE

— I/N => 57

▷ (q0) —5→ (q1) —7→ (q1)

O/P => 11 , NOT DIVISIBLE

6



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Mahim, Mumbai

Page No. :

Date :

	a	e	i	o	u	a	e	i	o	u
q^0	a	e	i	o	u	q^0	q^1	q^2	q^3	q^4
q^1	a	e	i	o	u	q^0	q^1	q^2	q^3	q^4
q^2	a	u	i	o	u	q^0	q^4	q^2	q^3	q^4
q^3	a	e	i	o	u	q^0	q^1	q^2	q^3	q^4
q^4	a	e	i	o	u	q^0	q^1	q^2	q^3	q^4

— I/N ⇒ a e i e

▷ q^0 —a→ q^0 —e→ q^1 —i→ q^2 —e→ q^4

O/P ⇒ a e u e

— I/N ⇒ a e i o u

▷ q^0 —a→ q^0 —e→ q^1 —i→ q^2 —o→ q^3 —u→ q^4

O/P ⇒ a e i o u

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(7) BINAR

▷ (

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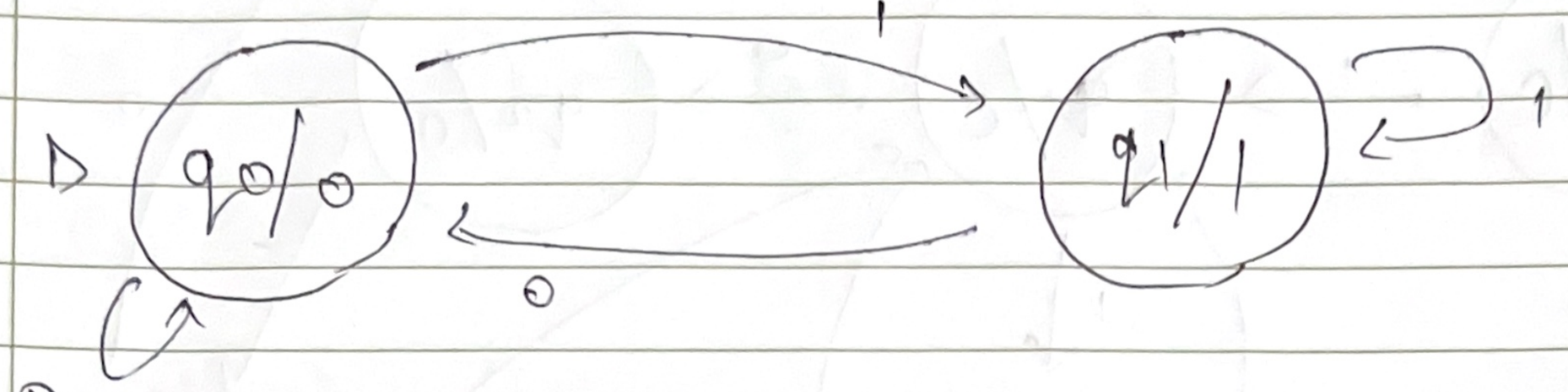
0

(7) BINARY NUMBER DIVISIBLE BY 2



	0	1	OUTPUT 0	OUTPUT 1
q_0	q_0	q_1	0	1
q_1	q_0	q_1	0	1

— I/N ⇒ 11

$q_0 \xrightarrow{1} q_1 \xrightarrow{1} q_1$

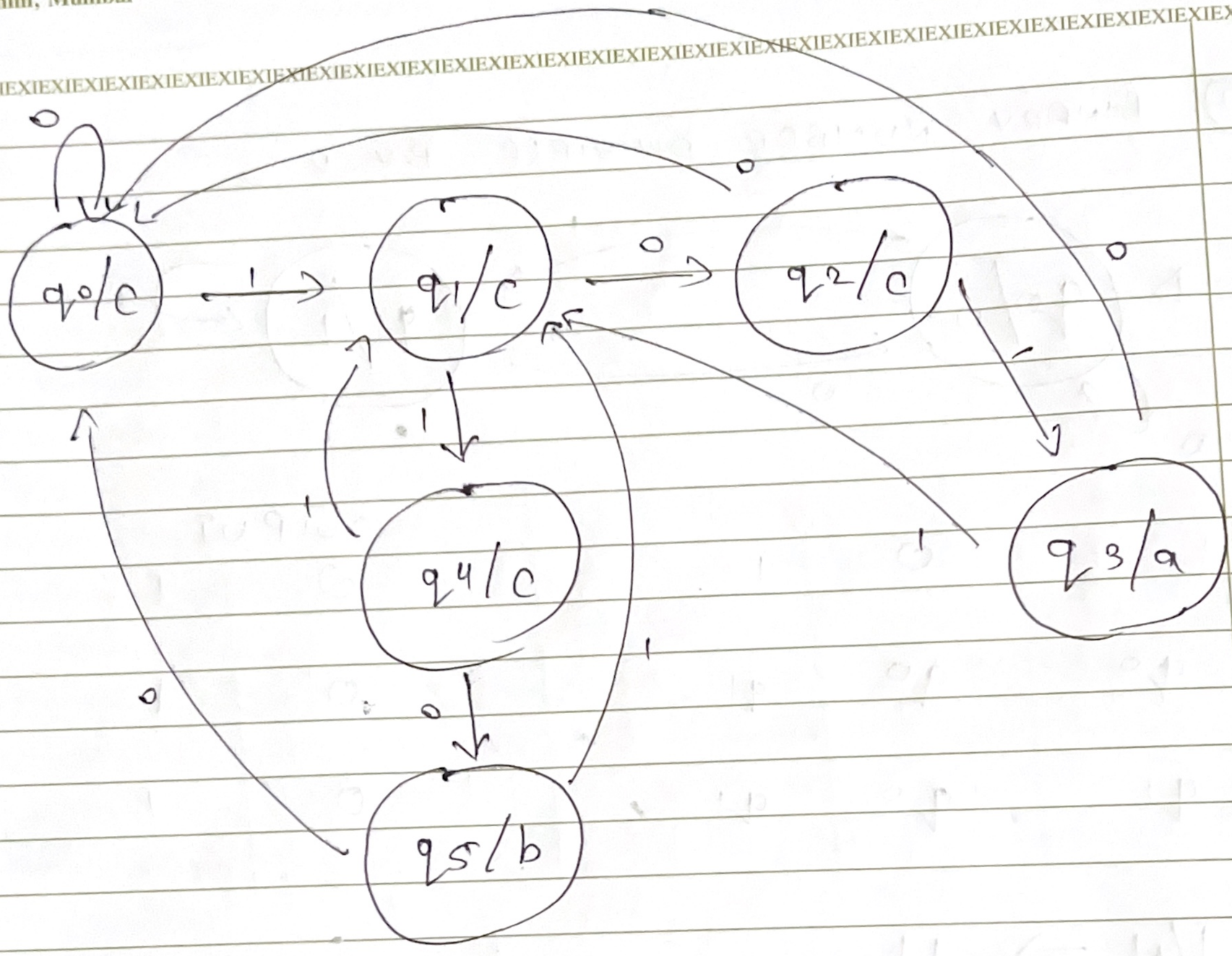
O/P ⇒ 11 , NOT DIVISIBLE

— I/N ⇒ 100

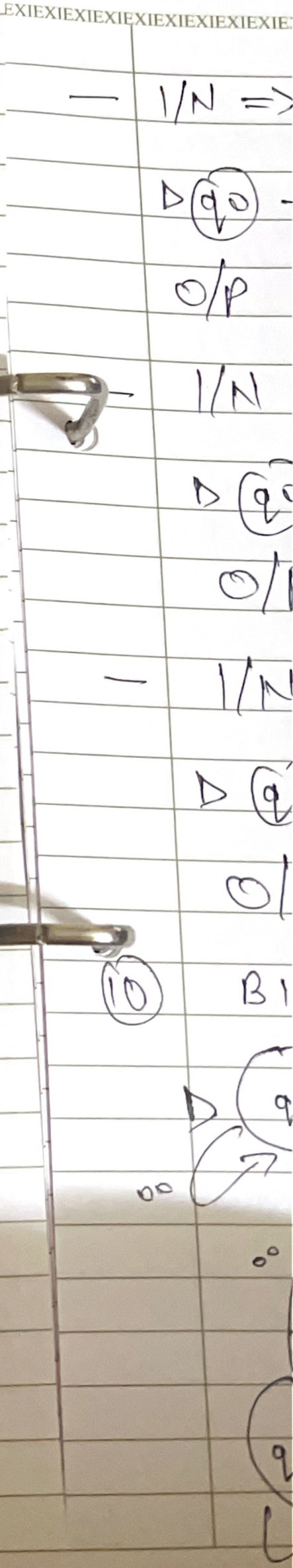
$q_0 \xrightarrow{1} q_1 \xrightarrow{0} q_0 \xrightarrow{0} q_0$

O/P ⇒ 100 , DIVISIBLE

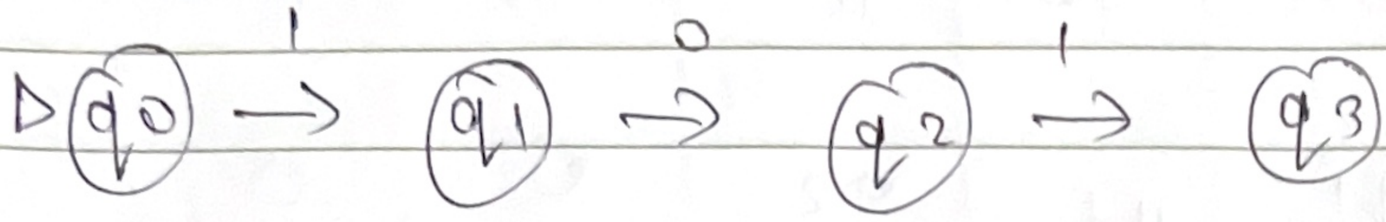
(8)



	OUTPUT	
	0	1
q0	q0	q1	c	c
q1	q2	q4	c	c
q2	q0	q3	c	a
q3	q0	q1	c	c
q4	q5	q1	b	c
q5	q0	q1	c	c

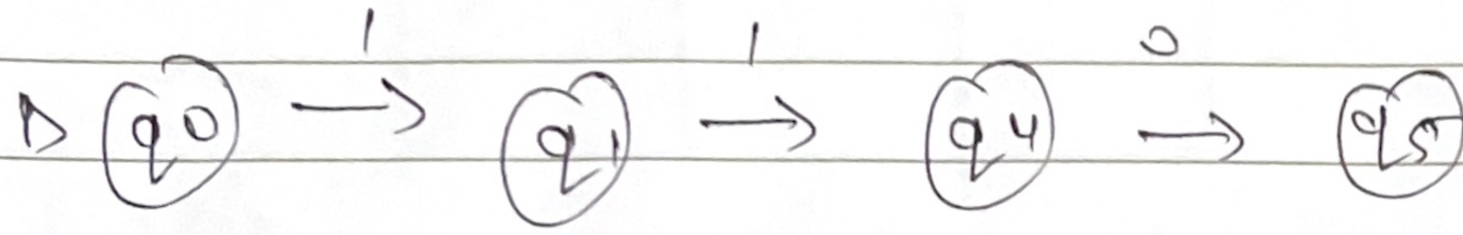


— I/N => 101



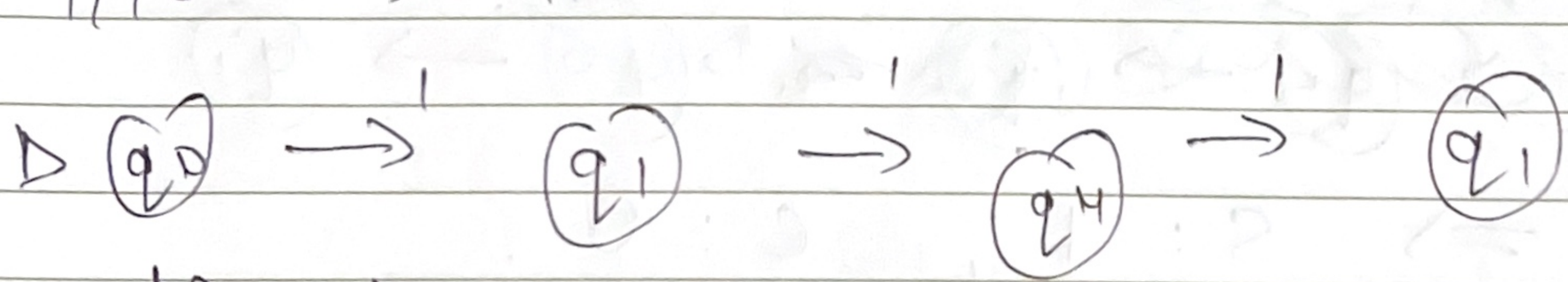
O/P => a

— I/N => 110



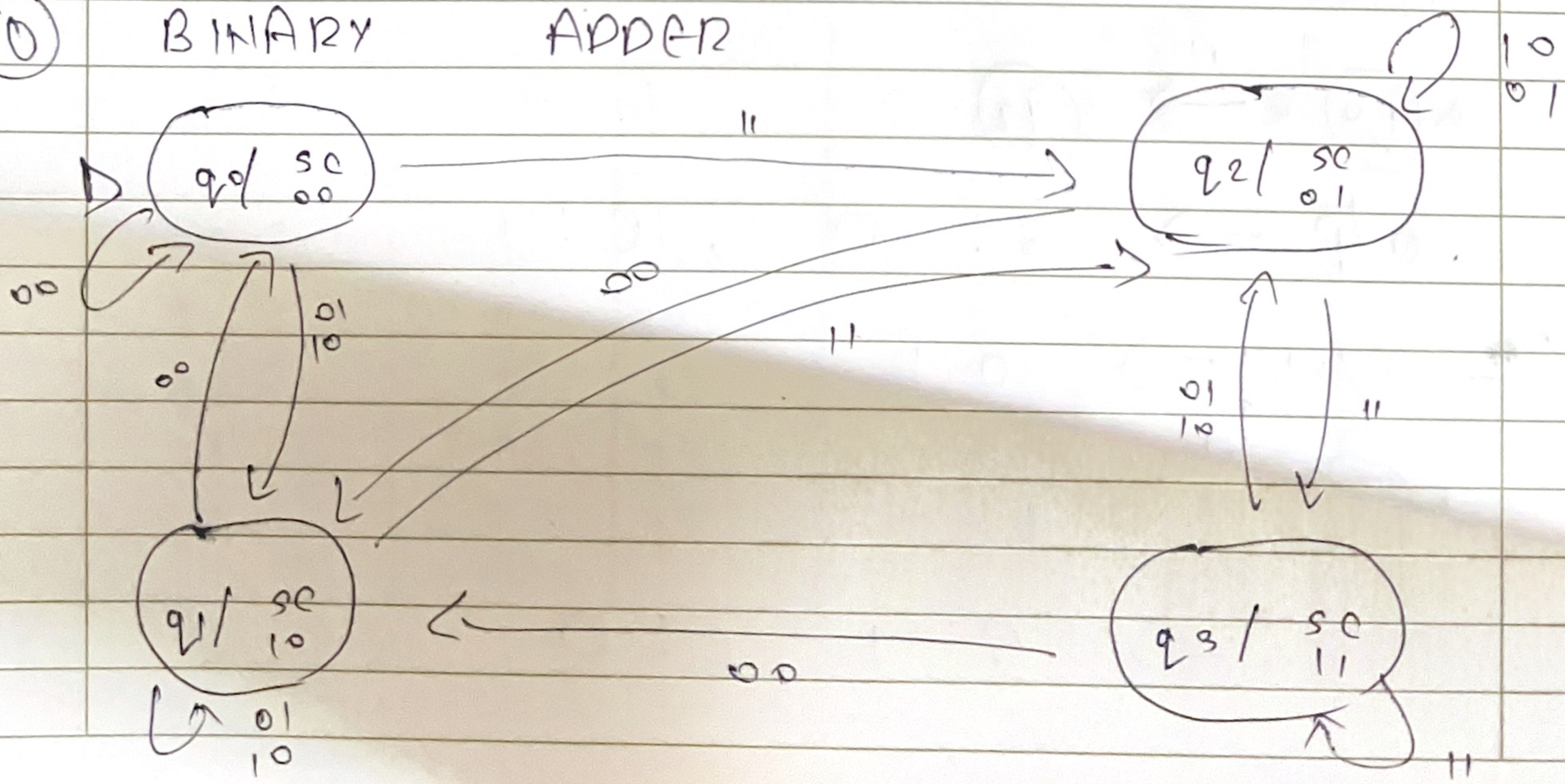
O/P => b

— I/N => 111



O/P => c

(10) BINARY ADDER



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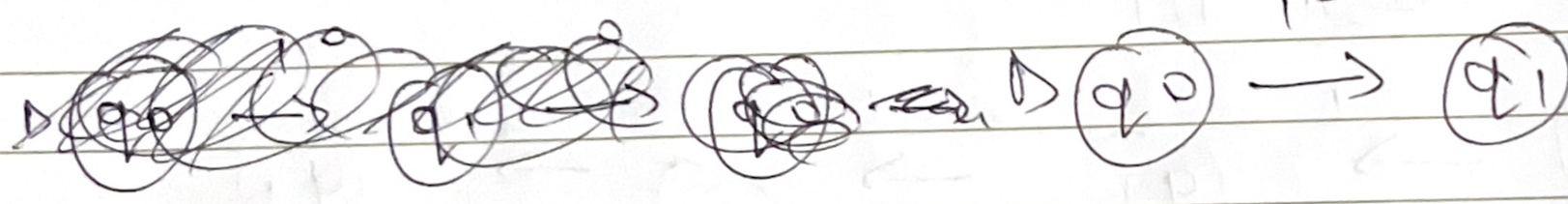
Page No. :

Date :

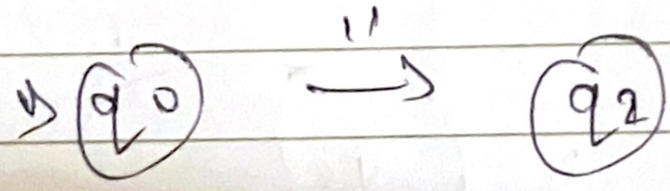
	00	01	10	11	OUTPUT S	OUTPUT C
q_0	q_0	q_1	q_1	q_2	0	0
q_1	q_0	q_1	q_1	q_2	1	0
q_2	q_1	q_1	q_2	q_3	0	1
q_3	q_1	q_2	q_2	q_3	1	1

— I/N ⇒ 10



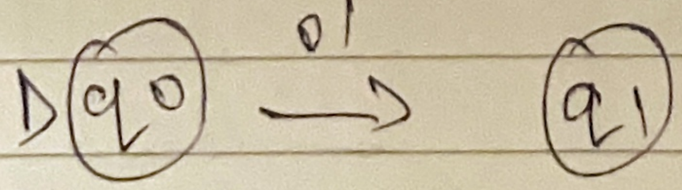
O/P ⇒ S : 1 , C : 0

— I/N ⇒ 11



O/P ⇒ S : 0 , C : 1

— I/N ⇒ 01



O/P ⇒ S : 1 , C : 0

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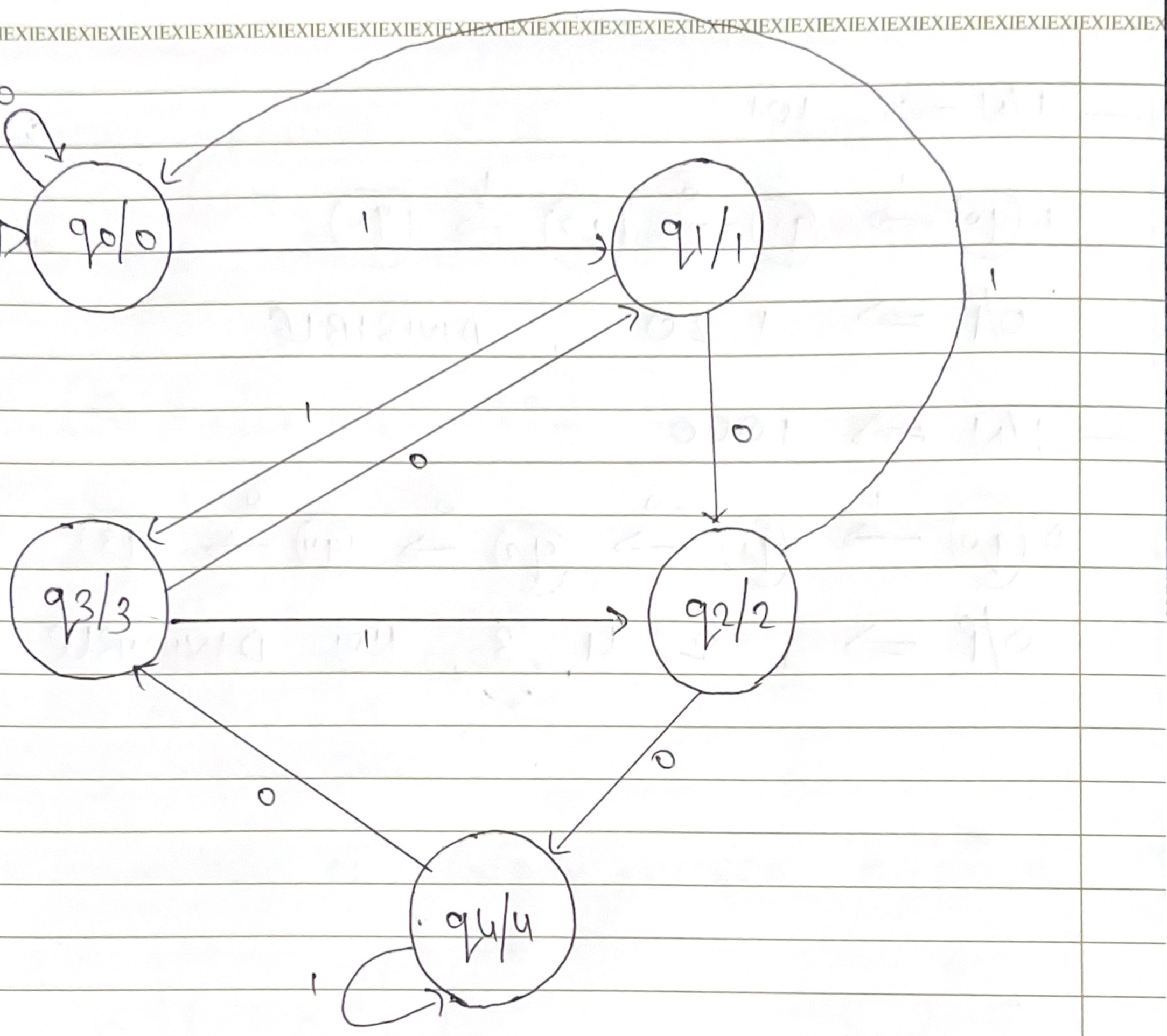

			OUTPUT		
	0	1	0	1	
q^0	q^0	q^1	0	1	
q^1	q^2	q^3	2	3	
q^2	q^4	q^0	4	0	
q^3	q^1	q^2	1	2	
q^4	q^3	q^4	3	4	

Page No. :

Date :

— I/N ⇒ 101

▷ (q0) —1→ (q1) —0→ (q2) —1→ (q0)

O/P ⇒ 1 2 0 , DIVISIBLE

— I/N ⇒ 1000

▷ (q0) —1→ (q1) —0→ (q2) —0→ (q4) —0→ (q3)

O/P ⇒ 1 2 4 3 , NOT DIVISIBLE

(1) A MEA
MACHIN
DETERM
AND

M = {

Q ⇒
Σ ⇒
Γ ⇒
δ ⇒
λ ⇒
q0 =

(2) 1's

q2
q0

I/N

▷ (q0)

O/P

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242466 **X. I. E.** ASSIGNMENT 3

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Page No. :

Date :

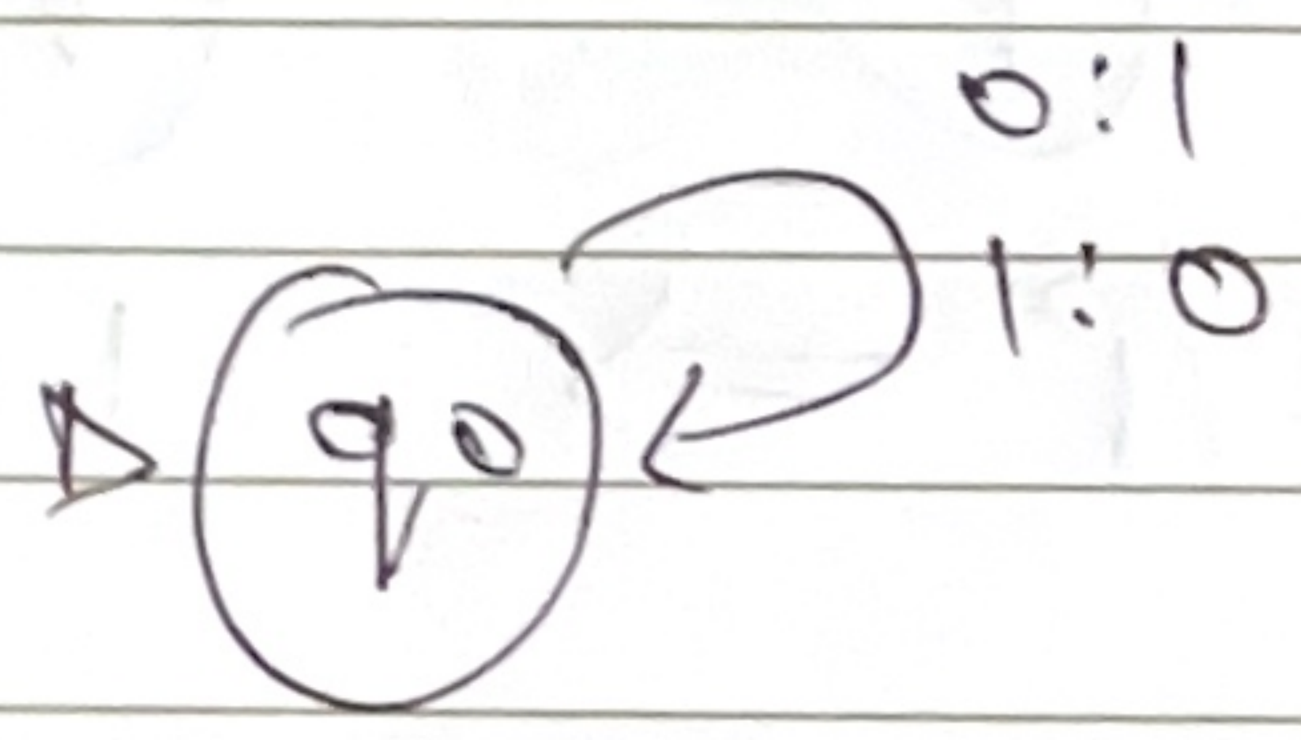
(1) A MEALY MACHINE IS A FINITE STATE MACHINE (FSM) WHERE OUTPUT IS DETERMINED BY BOTH CURRENT STATE AND CURRENT INPUT SYMBOL

$M = \{Q, \Sigma, \Gamma, \delta, \lambda, q_0\}$

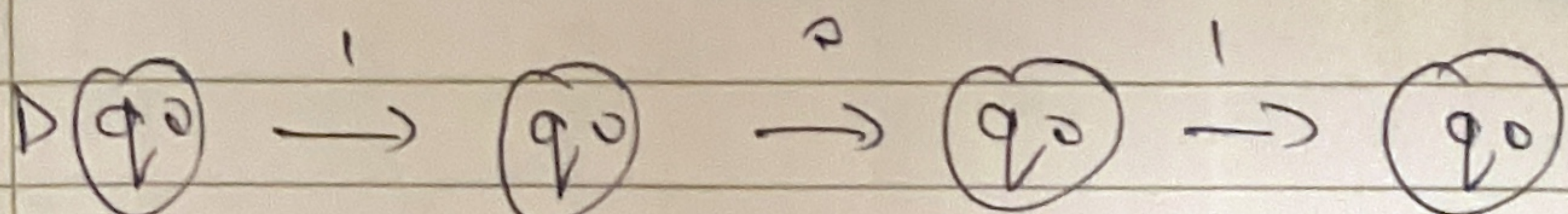
Q => SET OF STATES
Σ => SET OF INPUTS
Γ => SET OF OUTPUTS
δ => STATE TRANSITION
λ => OUTPUT OF STATE
q_0 => INITIAL STATE

(2) 1'S COMPLIMENT OF A BINARY NUMBER , $\Sigma = \{0,1\}$

			O/P	
	0	1	0	1
q_0	q_0	q_0	1	1
q_0	q_0	q_0	0	0



I/N => 101



O/P => 010

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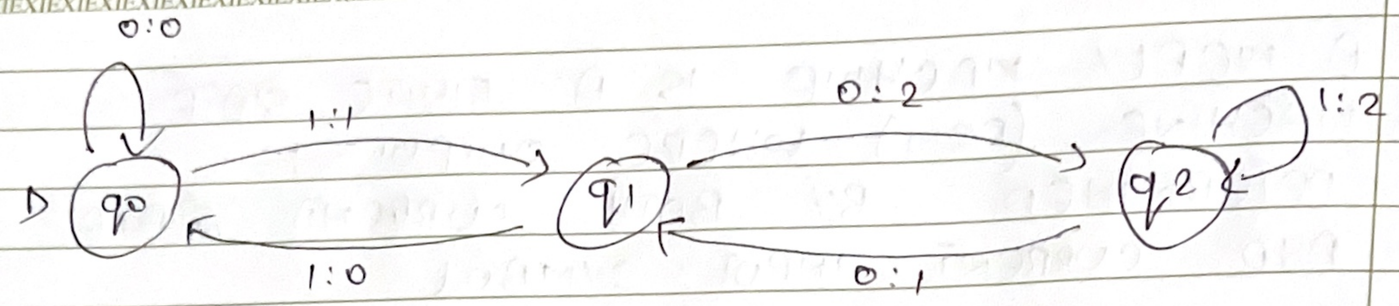
Page No. :
Date :

(3)



	0	1	O/P
q^0	q^0	q^1	1
q^1	q^2	q^0	0
q^2	q^1	q^2	0

— I/N ⇒ 1101

▷(q0) —1→ (q1) —1→ (q0) —0→ (q0) —1→ (q1)

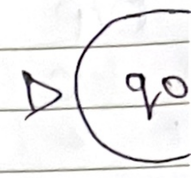
O/P ⇒ 1001, NOT DIVISIBLE

— I/N ⇒ 1001

▷(q0) —1→ (q1) —0→ (q2) —0→ (q1) —1→ (q0)

O/P ⇒ 1210, DIVISIBLE

(4)

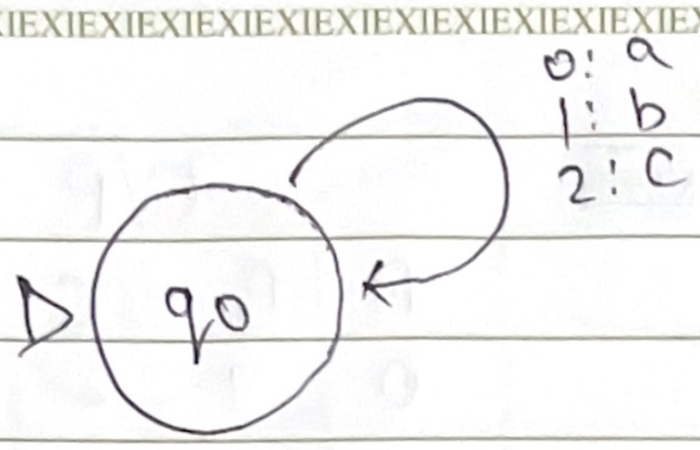


— I/N ⇒

(5)

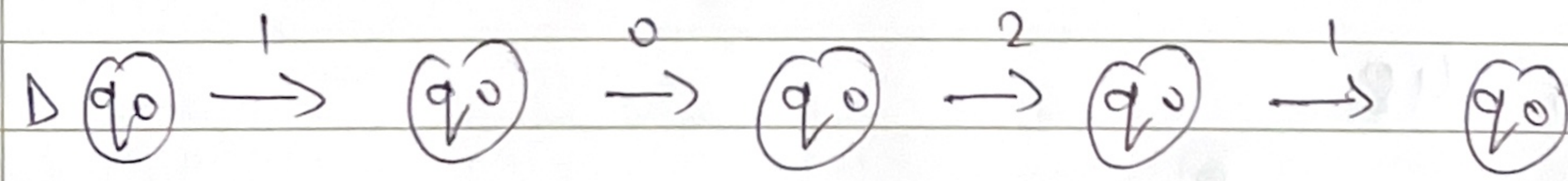
EXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEXIEX

(4)



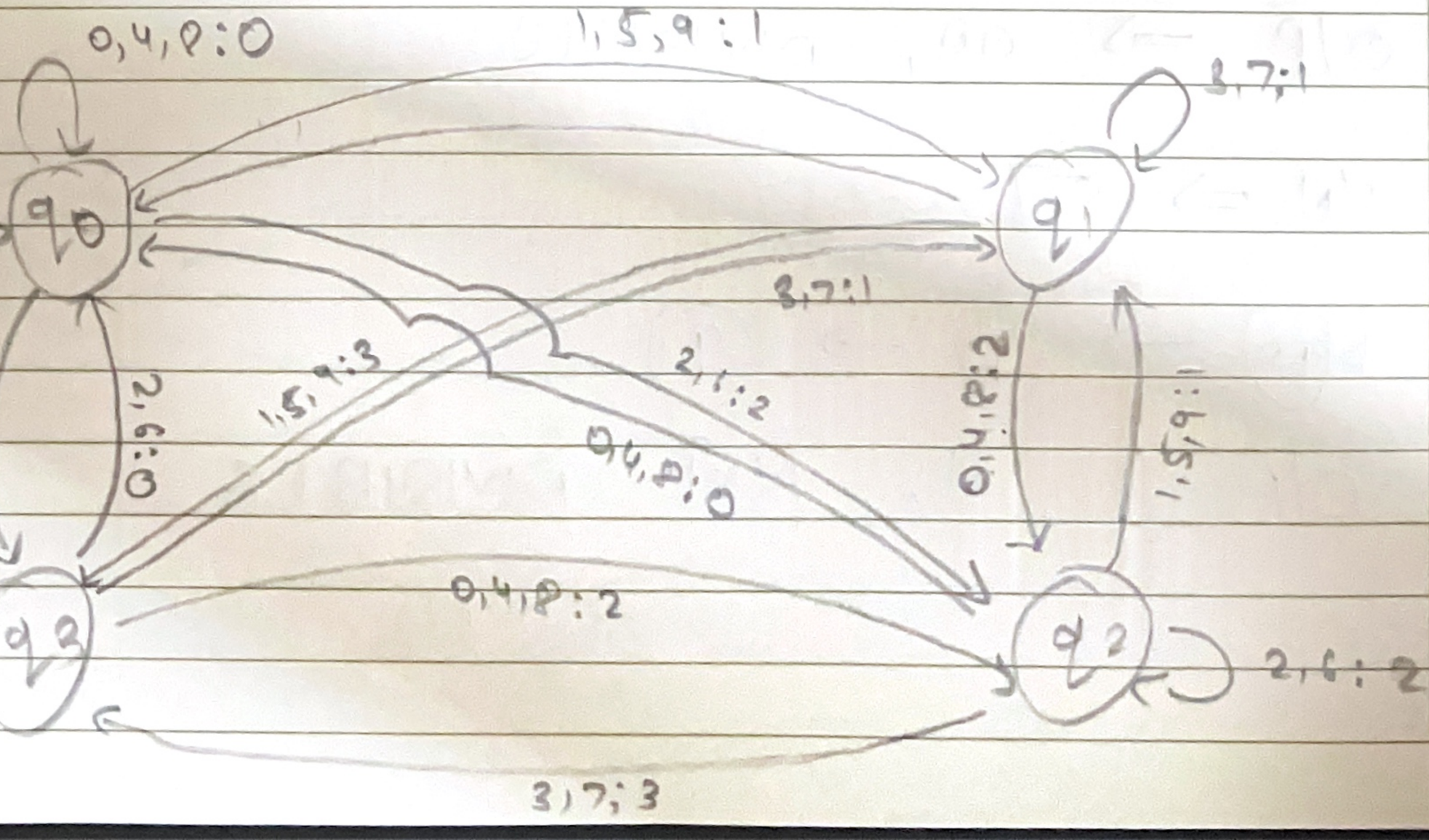
	I/N	NXT	O/P
q0	0	q0	a
q0	1	q0	b
q0	2	q0	c

— I/N ⇒ 1 0 2 1



O/P ⇒ b a c b

(5)



Page No. :

Date :

STATE	I/N				O/P			
	A	B	C	D	A	B	C	D
q_0	q_0	q_1	q_2	q_3	0	1	2	3
q_1	q_2	q_3	q_0	q_1	2	3	0	1
q_2	q_0	q_1	q_2	q_3	0	1	2	3
q_3	q_2	q_3	q_0	q_1	2	3	0	1

0, 4, 8 $\Rightarrow$ A
1, 5, 9 $\Rightarrow$ B
2, 6 $\Rightarrow$ C
3, 7 $\Rightarrow$ D

- I/N $\Rightarrow$ 48

$\rightarrow (q_0) \xrightarrow{4} (q_0) \xrightarrow{8} (q_0)$

O/P $\Rightarrow$ 00, DIVISIBLE

- I/N $\Rightarrow$ 57

$\rightarrow (q_0) \xrightarrow{5} (q_1) \xrightarrow{7} (q_1)$

O/P $\Rightarrow$ 11, NOT DIVISIBLE

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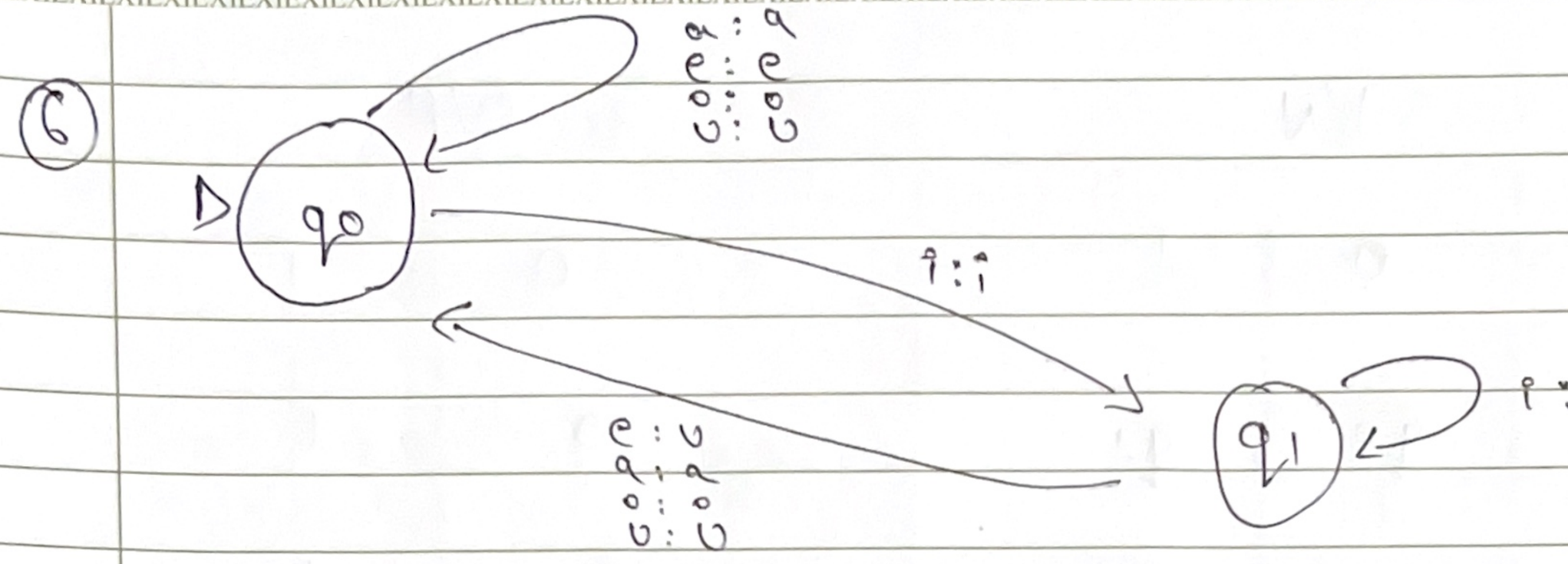
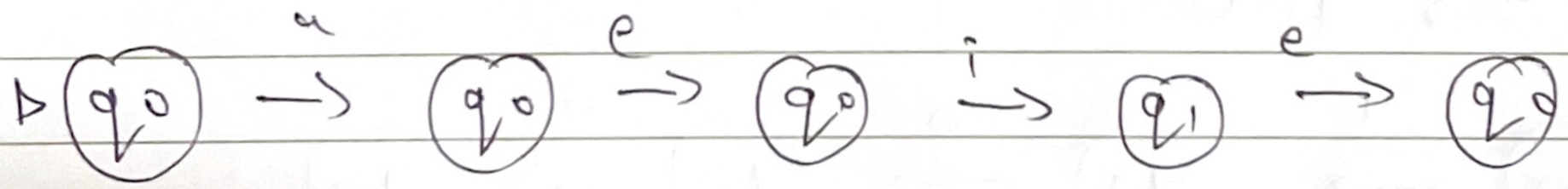
(6)

$\rightarrow (q_0$



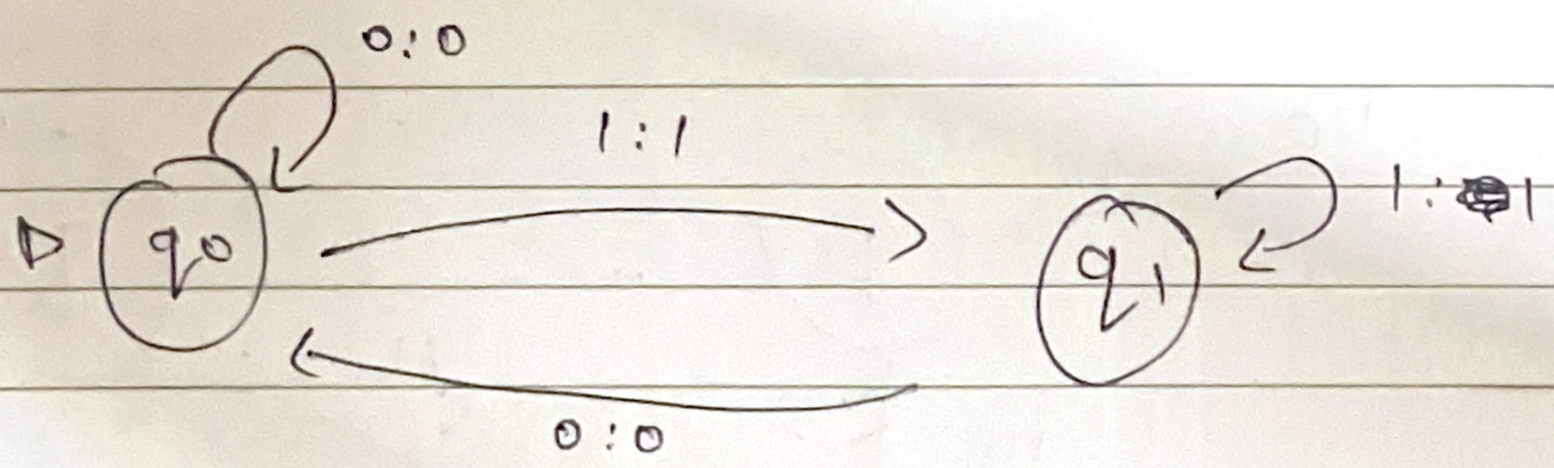
	I/N					O/P				
	a	e	i	o	u	a	e	i	o	u
q0	q0	q0	q1	q0	q0	a	e	i	o	u
q1	q0	q0	q1	q0	q0	a	u	i	o	u

— I/N ⇒ a e i e



O/P ⇒ a e i u

(7)



NXT Pg →

	I/N	O/P
	0 1	0 1
q0	q0 q1	0 1
q1	q0 q1	0 1

- I/N => 11

▷ (q0) --1--> (q1) --1--> (q1)

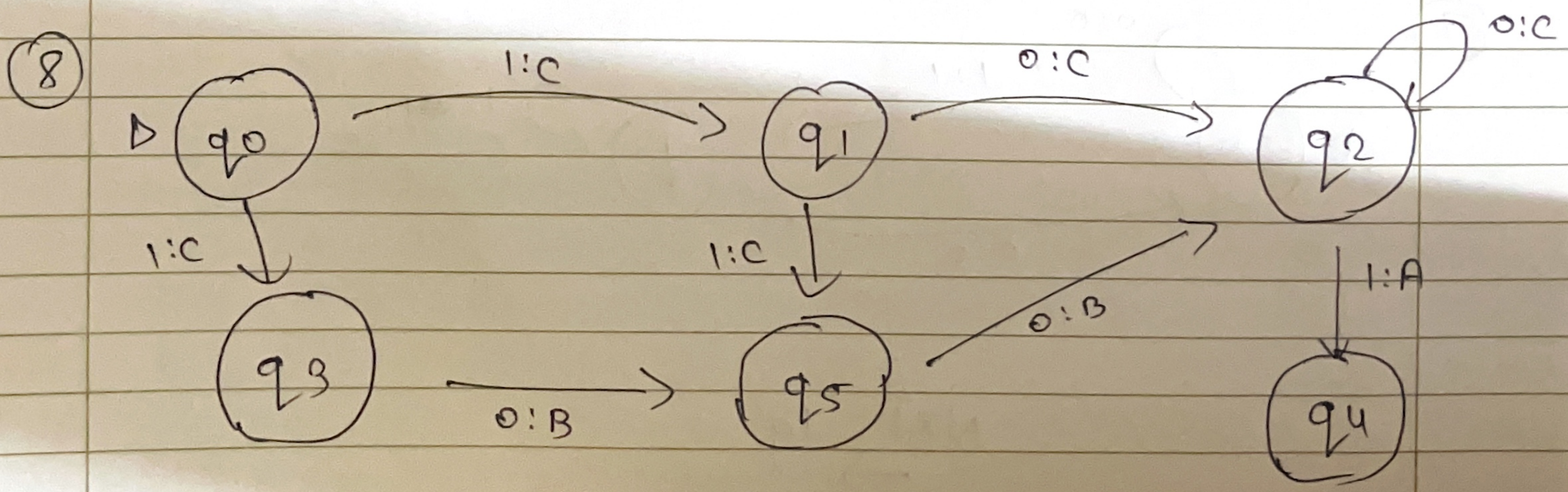
O/P => 11, NOT DIVISIBLE

- I/N => 100

▷ (q0) --1--> (q1) --0--> (q0) --0--> (q0)

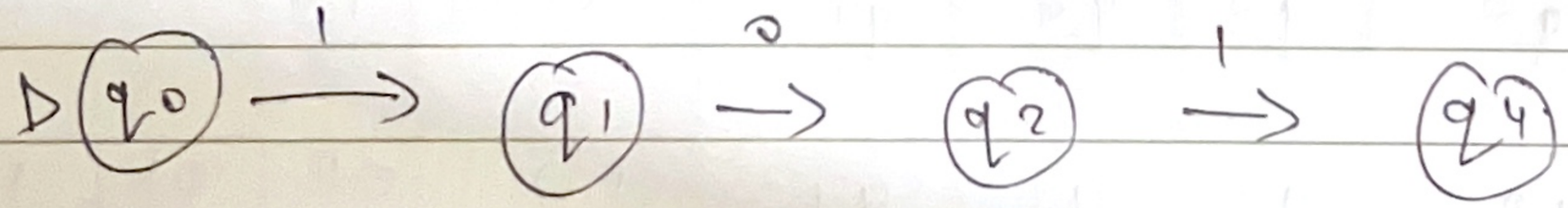
O/P => 100, DIVISIBLE

8



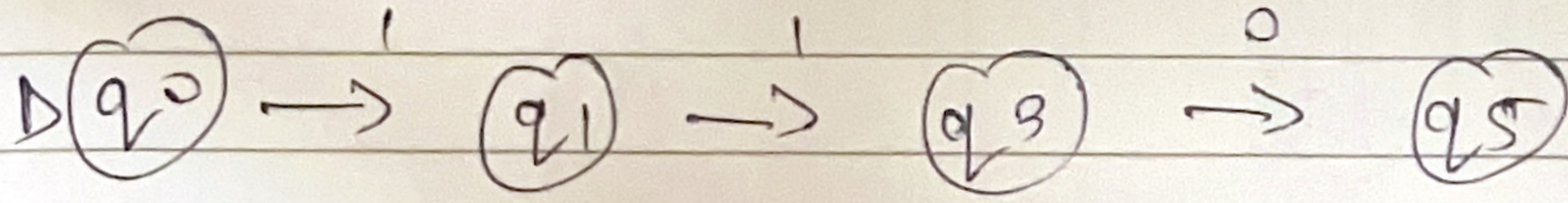
	I/N	O/P
	0	1
q0	q0	q2	C	C
q1	q2	q3	C	C
q2	q0	q4	C	A
q3	q5	q3	B	C
q4	q2	q3	A	A
q5	q2	q3	B	B

— I/N => 101



O/P => a

— I/N => 110



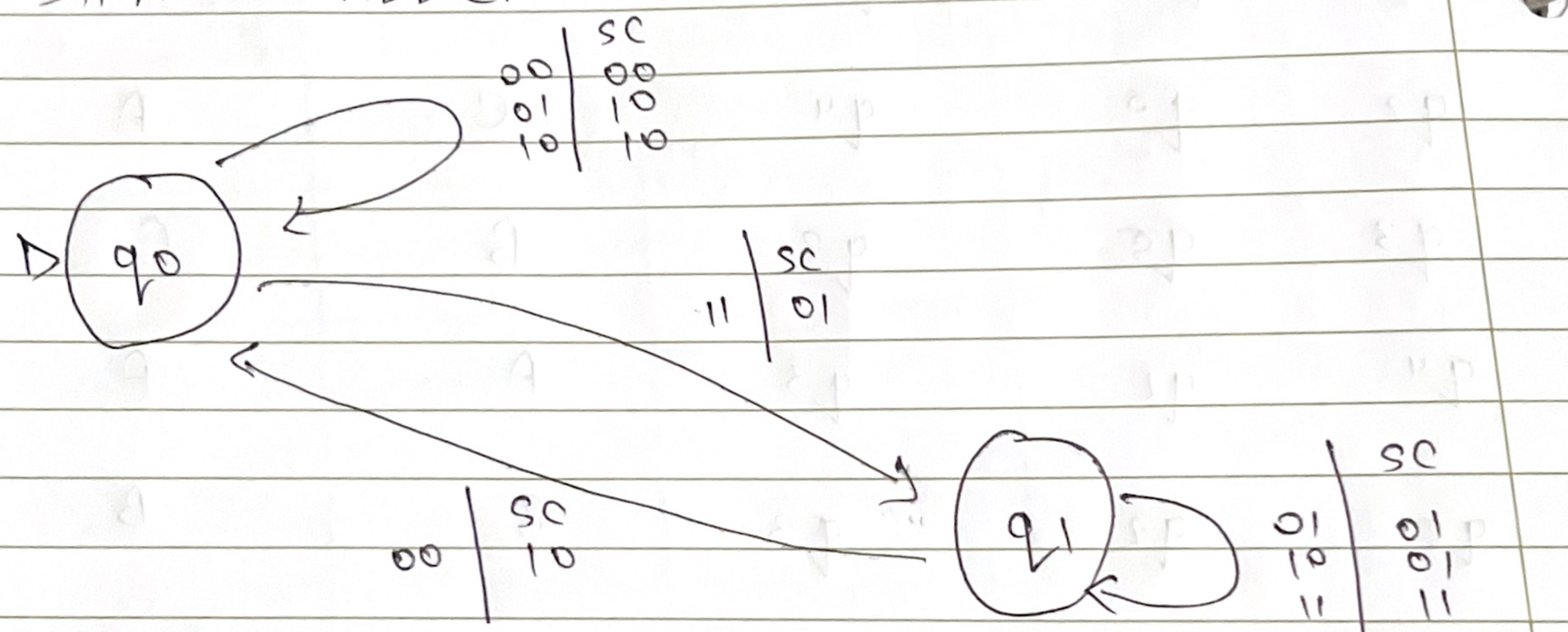
O/P => b

- I/N => 111

▷ (q0) --1--> (q1) --1--> (q3) --1--> (q3)

O/P => C

(10) BINARY ADDER



	00	01	10	11	S	C		
q0	q0	q0	q0	q1	00	10	10	01
q1	q0	q1	q1	q1	10	01	01	11

- I/N => 10

▷ (q0) --10--> (q0)

O/P => SC : 10

1/N ⇒ 11

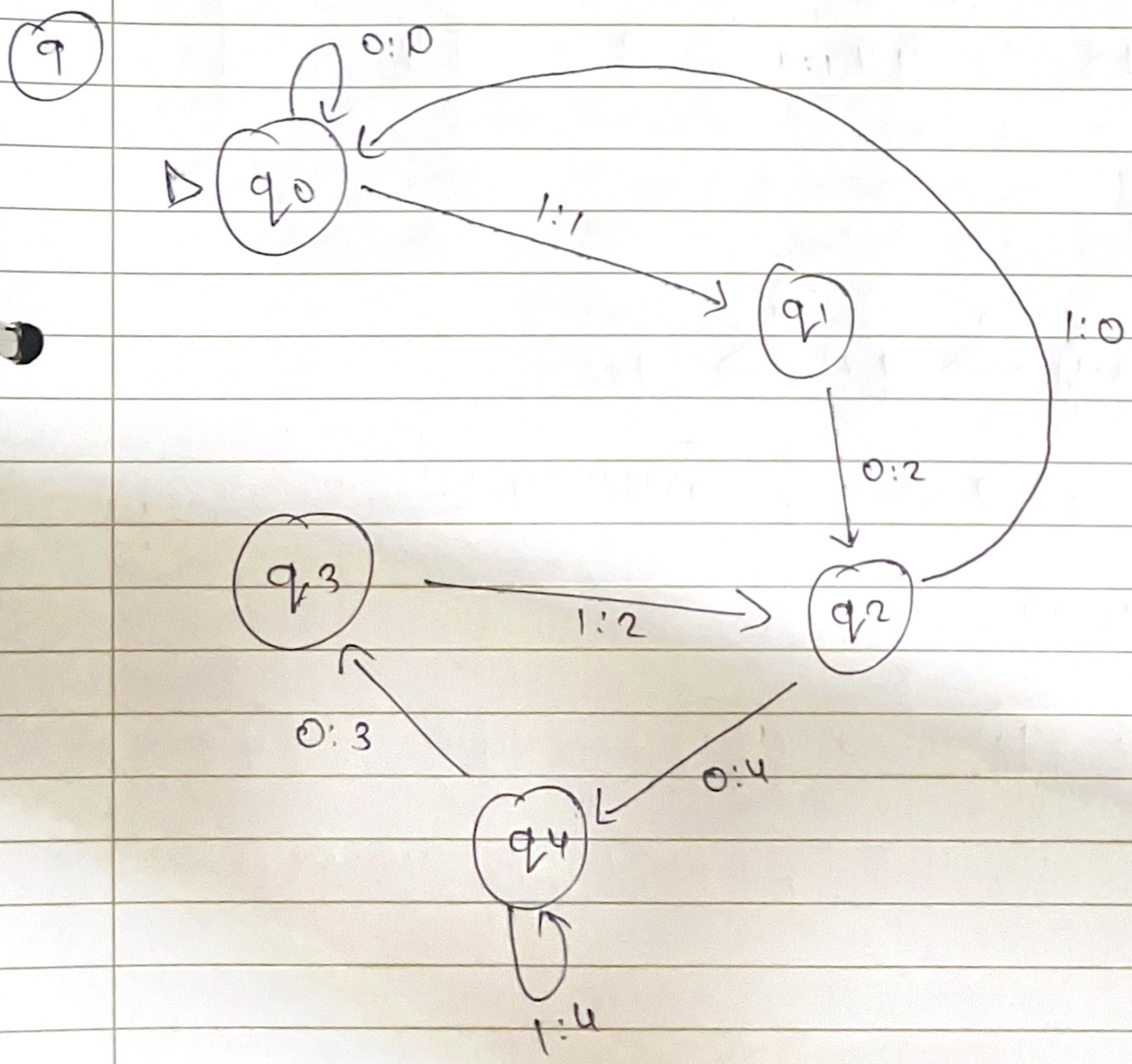
11
▷ (q0) → (q1)

o/p ⇒ SC : 01

1/N ⇒ 01

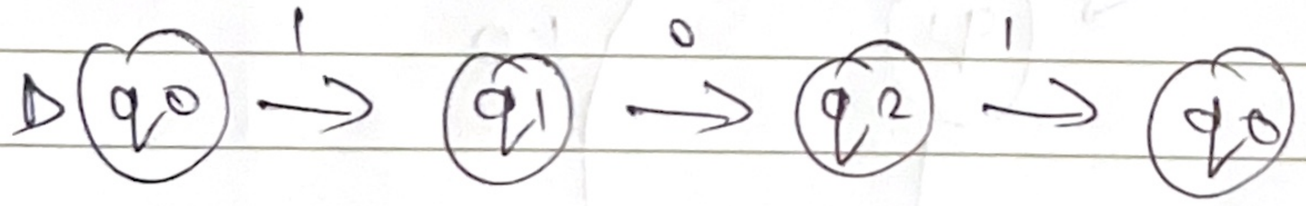
01
▷ (q0) → (q0)

o/p ⇒ SC : 01



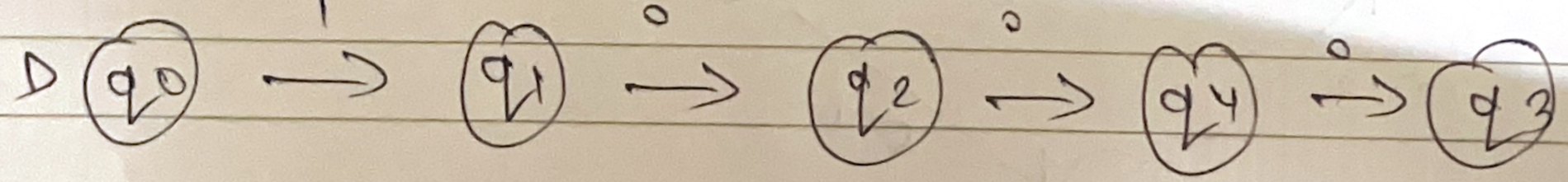
	I/N	O/P	
	0	1	0	1
q^0	q^0	q^1	0	1
q^1	q^2	q^3	2	3
q^2	q^4	q^0	4	0
q^3	q^1	q^2	1	2
q^4	q^3	q^4	3	4

- I/N => 101



O/P => 120 , DIVISIBLE

- I/N => 1000



O/P => 1243 , NOT DIVISIBLE