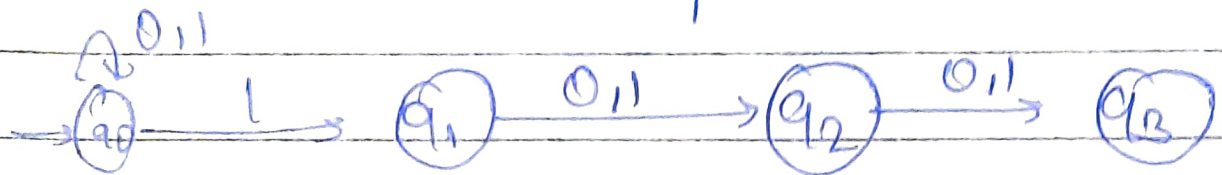


Name: Raghav Maheshwari  
Roll NO: 53  
Batch: A4  
Panel: A

## Theory Assignment 1 (TOC)

Construct DFA equivalent NFA



$$Q = \{q_0, q_1, q_2, q_3\}$$

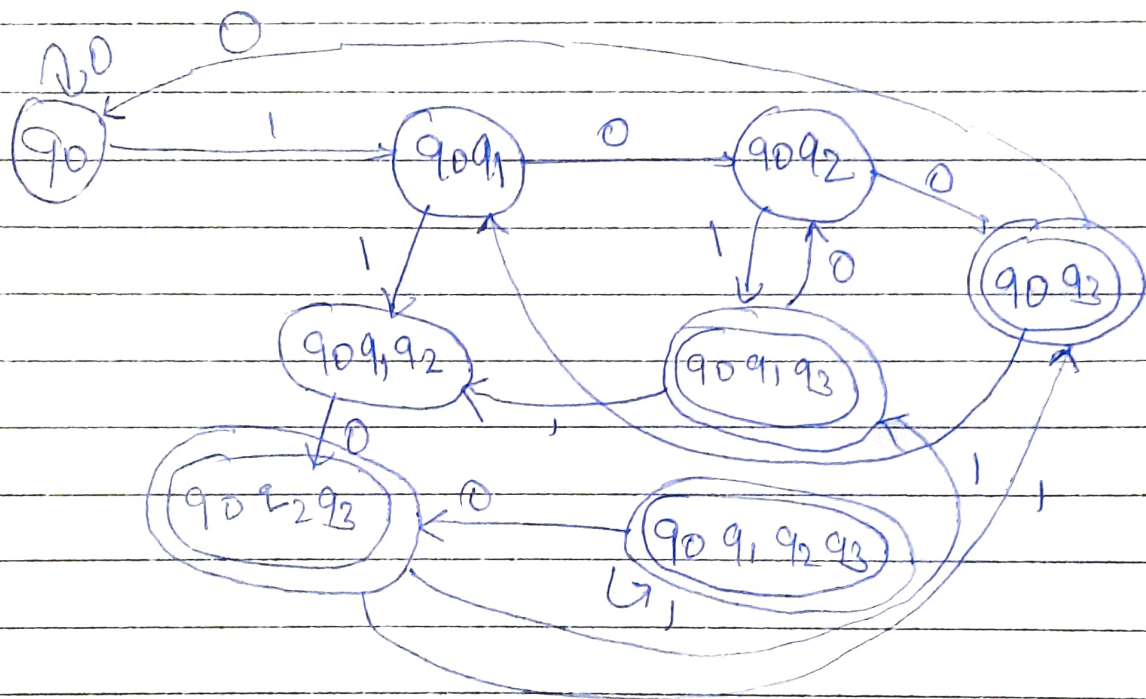
$$\Sigma = \{0, 1\}$$

$$F = \{q_3\}$$

$\delta =$	State	0	1
	$q_0$	$\{q_0\}$	$\{q_0, q_1\}$
	$q_1$	$\{q_2\}$	$\{q_2\}$
	$q_2$	$\{q_3\}$	$\{q_3\}$
	$q_3$	$\emptyset$	$\emptyset$

New State: Transition table.

State	0	1
q <sub>0</sub>	{q <sub>0</sub> }	{q <sub>0</sub> q <sub>1</sub> }
q <sub>0</sub> q <sub>1</sub>	{q <sub>0</sub> q <sub>2</sub> }	{q <sub>0</sub> q <sub>1</sub> q <sub>2</sub> }
q <sub>0</sub> q <sub>2</sub>	{q <sub>0</sub> q <sub>3</sub> }	{q <sub>0</sub> q <sub>1</sub> q <sub>3</sub> }
q <sub>0</sub> q <sub>1</sub> q <sub>2</sub>	{q <sub>0</sub> q <sub>2</sub> q <sub>3</sub> }	{q <sub>0</sub> q <sub>1</sub> q <sub>2</sub> q <sub>3</sub> }
q <sub>0</sub> q <sub>3</sub>	{q <sub>0</sub> }	{q <sub>0</sub> q <sub>1</sub> }
q <sub>0</sub> q <sub>1</sub> q <sub>3</sub>	{q <sub>0</sub> q <sub>2</sub> }	{q <sub>0</sub> q <sub>1</sub> q <sub>2</sub> }
q <sub>0</sub> q <sub>2</sub> q <sub>3</sub>	{q <sub>0</sub> q <sub>3</sub> }	{q <sub>0</sub> q <sub>1</sub> q <sub>3</sub> }
q <sub>0</sub> q <sub>1</sub> q <sub>2</sub> q <sub>3</sub>	{q <sub>0</sub> q <sub>2</sub> q <sub>3</sub> }	{q <sub>0</sub> q <sub>1</sub> q <sub>2</sub> q <sub>3</sub> }



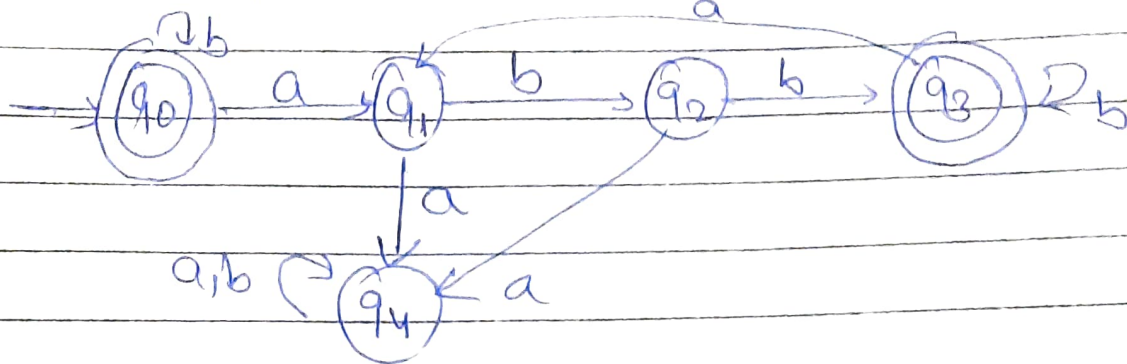
$$Q' = \{q_0, q_0q_1, q_0q_2, q_0q_1q_2, q_0q_1q_3, q_0q_3, q_0q_2q_3, q_0q_1q_2q_3\}$$

$$F' = \{[q_0q_2], [q_0q_1q_3], [q_0q_2q_3], [q_0q_1q_2q_3]\}$$

Q2 Design a FA which accepts every string in which every a is followed by bb

Ans  $\Sigma = \{a, b\}$

$L = \{abb, abbabb, \epsilon, abbb, \dots\}$



$Q = \{q_0, q_1, q_2, q_3, q_4\}$

$F = \{q_0, q_3\}$

Q3 Design a R.E. for string that contain atmost one pair of 0's and atmost 1 pair of 1's

Ans  $R = (0+)^* ((00 + \epsilon) + (11 + \epsilon)) (0+)^*$

Q4 R.E. =  $1(11)^*$

Ans One and zero or more occurrence of 11

$L = \{1, 11, 1111, 111111, \dots\}$