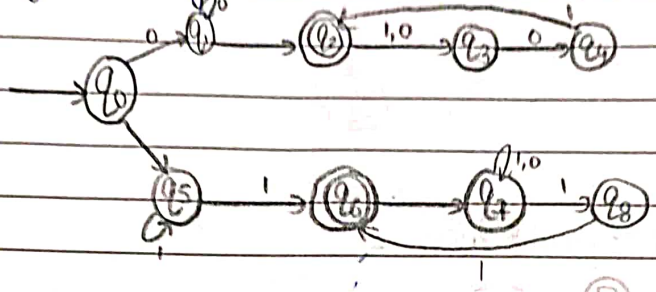
Subject :- Automata Theory | Experiment / Tutorial / Assignment No. :- 03 | Page :- 01

Q.1] Construct NFA for each of the following:-

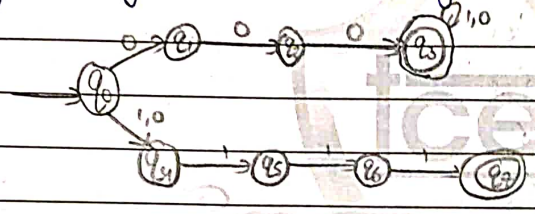
a) Binary Strings that begin with 11 and end with 11 or begin with 00 and end with 00.

Ans



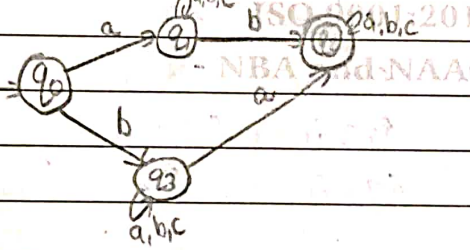
b) Binary Strings Starting with 000 or ending with 111 (or both)

Ans



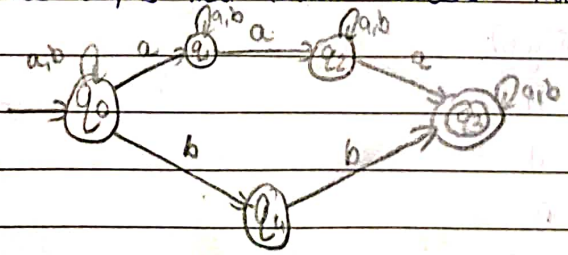
c) Strings over {a,b,c} that contains atleast one a and atleast one b.

Ans



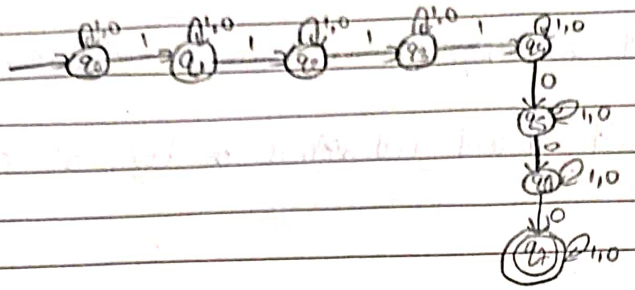
d) String over {a,b} that contain atleast three a's or atleast two b's.

Ans



e) Binary Strings in which the first part of each string contains atleast four 1's and the second part contains atleast three 0's.

Ans



Q.2] For following NFA find equivalent DFA.

a)

	a	b	ε
1	{2,3}	{1}	{}
2	{3}	{3,4}	{4}
☆ 3	{4}	{}	{}
☆ 4	{2,3}	{4}	{3}

Ans

x	y-ε-closure	δ(y,a)	δ(y,b)
{1}	{1}	{2,3}	{1}
☆ {2,3}	{2,3,4}	{2,3,4}	{1,3,4}
☆ {2,3,4}	{2,3,4}	{2,3,4}	{1,3,4}
☆ {1,3,4}	{1,3,4}	{2,3,4}	{1}

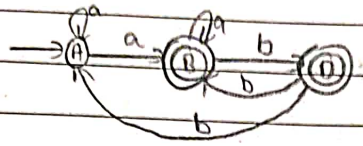
A = {1}, B = {2,3}, C = {2,3,4}, D = {1,3,4}

∴ Table becomes:

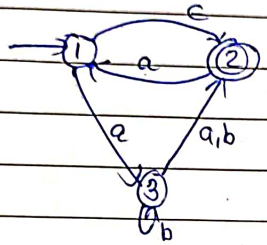
x	δ(y,a)	δ(y,b)
A	B	A
☆ B	C	D
☆ C	C	D
☆ D	C	A

x	δ(y,a)	δ(y,b)
A	B	A
☆ B	B	D
☆ D	B	A

∴ DFA according to table.



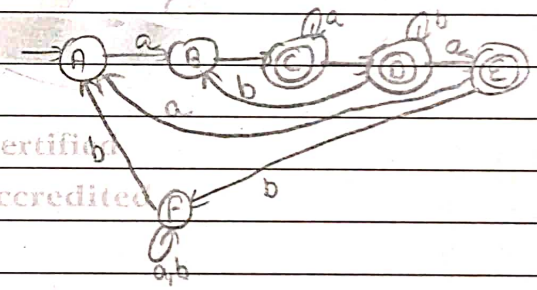
b.)



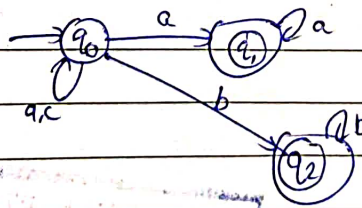
x	y = ε(x)	a	b
{1}	{1,2}	{1,3}	{}
{1,3}	{1,2,3}	{1,2,3}	{2,3}
* {2,3}	{2,3}	{1,2}	{2,3}
* {1,2}	{1,2}	{1,3}	{}
* {1,2,3}	{1,2,3}	{1,2,3}	{2,3}

∴ A = {1}, B = {1,3}, C = {1,2,3}, D = {2,3}

x	δ(y,a)	δ(y,b)
A	B	F
B	C	D
* C	C	D
* D	E	D
* E	B	F



c)

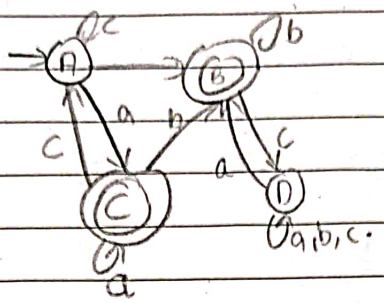


x	δ(y,a)	δ(y,b)	δ(y,c)
{q0}	{q0,q1}	{q2}	{q0}
* {q2}	{q1}	ε	{}
* {q0,q1}	{q0,q1}	{q2}	{q0}

Let A = {q0} B = {q2} C = {q0,q1}

X	δ(y,a)	δ(y,b)	δ(y,c)
A	C	B	A
* B	D	B	D
* C	C	B	A

Subject :- Experiment / Tutorial / Assignment No. :- Page :-



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