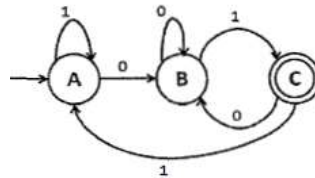


a. Construct DFA

1. $\Sigma = \{0,1\}$ and strings that have an odd number of 1's and any number of 0's.
2. for $\Sigma = \{a, b, c\}$ that accepts any string with aab as a substring
3. $\Sigma = \{x, y\}$, where if a substring yy is present, then it has to be followed by an x.
4. $\{0,1\}$ in which, every substring of 3 symbols has at most two zeros. For example, 001110 and 011001 are in the language, but 100010 is not.
5. Over $\{a, b\}$, all strings with atleast one a.
6. Over $\{a, b\}$, strings except those ends with abb
7. Over $\{a, b\}$, all strings with b as a second letter.
8. Over $\{0,1\}$ all strings ending with 00
9. Over $\{0,1\}$ detects even number of 0's
10. Over $\{a, b\}$, $L = \{w \mid n_a(w) > 1\}$, where $n_a(w)$ is the number of a's in w
11. Over $\{0,1\}$ strings with atleast 2 0's and ending with atleast 2 1's.
12. $L = \{w \mid w \text{ denotes an odd binary number}\}$
13. Over $\{a, b\}$, $L = \{awa\}$
14. $L = \{w_1aw_2 \mid w_1, w_2 \in \{a, b\}^*, |w_1| = 2, |w_2| \geq 2\}$
15. $L = \{w \in (0, 1)^* \mid w \text{ contains at least two 0s, or exactly two 1s}\}$

b. What is the language of below DFA?



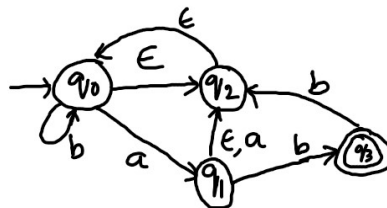
- c. Show that the string ababa is accepted for DFA of a.13
- d. Check whether the language $L = \{a^{2n}b^{3m}c \mid n \geq 1, m \geq 0\}$ is regular.

e. Define NFA

1. Over $\{a, b\}$, $L = (a + b)^* b (a + b)$
2. Over $\{a, b\}$, $L = \{w \mid w \text{ belongs to } abab^n \text{ or } aba^n\}$
3. Over $\{a, b\}$, all strings ending with aba
4. Over $\{a, b\}$, all strings ending with ab or ba

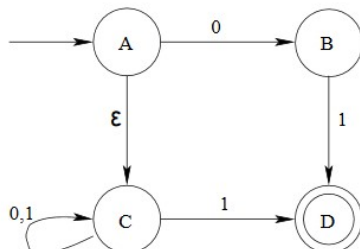
f. Show that

1. strings abab is accepted for NFA of e.2
2. $\delta^*(q_2, aba)$ for

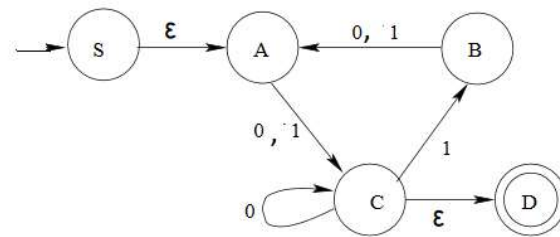


g. Convert to DFA

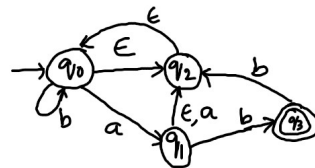
1. All NFA's of question e.
- 2.



3.



4.



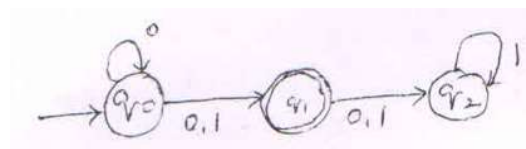
5.

δ_N	ϵ	a	b	c
$\rightarrow p$	$\{q, r\}$	$\{d\}$	$\{q\}$	$\{r\}$
q	\emptyset	$\{p\}$	$\{r\}$	$\{p, q\}$
$* r$	\emptyset	\emptyset	\emptyset	\emptyset

6.

δ_N	0	1
$\rightarrow p$	$\{q, b\}$	$\{q\}$
$* q$	$\{r\}$	$\{q, r\}$
r	$\{s\}$	$\{p\}$
$* s$	\emptyset	$\{p\}$

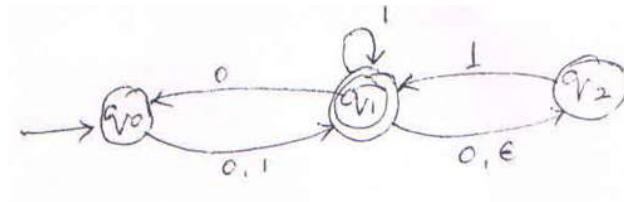
7.



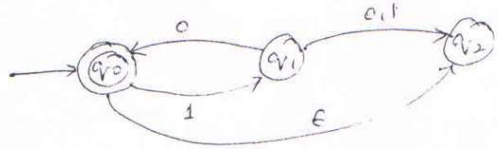
8.

δ_N	ϵ	a	b	c
$\rightarrow p$	$\{q, r\}$	\emptyset	$\{q\}$	$\{r\}$
q	\emptyset	$\{p\}$	$\{r\}$	$\{p, q\}$
$* r$	\emptyset	\emptyset	\emptyset	\emptyset

9.

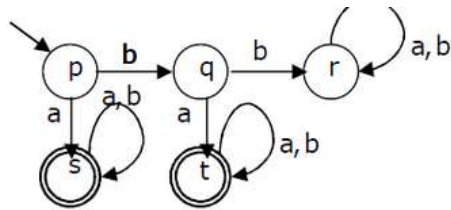


10.

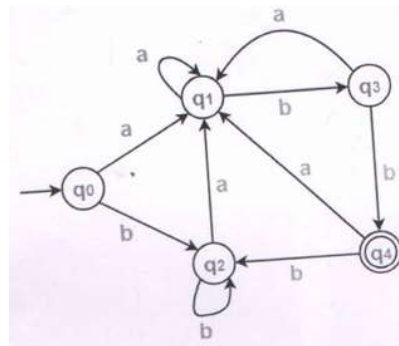


h. Minimize DFA

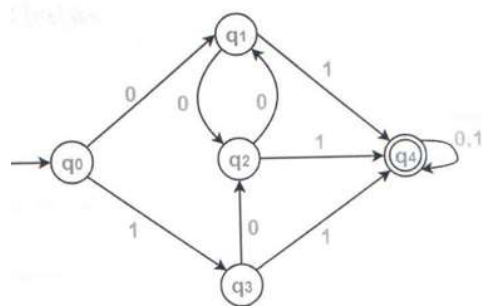
1.



2.



3.



4.

