Branch : CSE/IT Batch : Hinglish

Theory of Computation
DFA part-2

DPP-05

[MCQ]

1. Design deterministic finite automata of set of all binary strings over Σ = {0,1}, where every binary string starting with 00100. How many minimum numbers of states required for above FA?

(a) 6 (b) 5

(c) 7 (d) 4

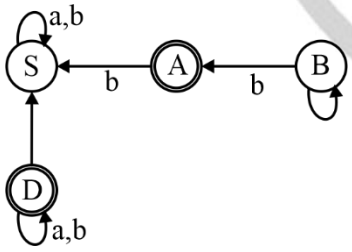
[NAT]

2. How many states are required to design a minimal DFA for set of all binary strings over Σ = {0, 1} where every binary string containing '0110' as a substring? ____ .

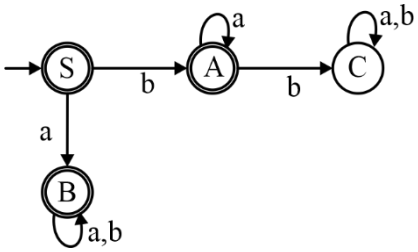
[MCQ]

3. Which of the following is correct design of a minimal DFA for set of all strings over Σ = {a, b} where every string does not start with bb?

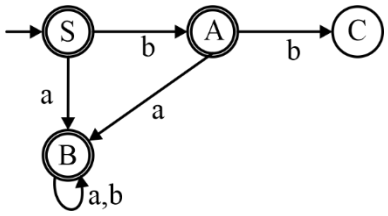
(a)



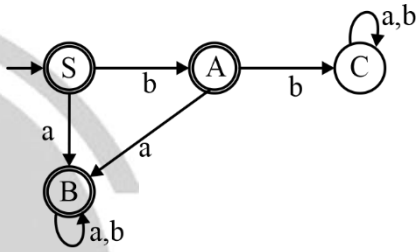
(b)



(c)



(d)



[MSQ]

4. Which of the following statement is/are correct?

(a) DFA is possible for every regular language

(b) DFA is also possible for some non-regular languages.

(c) DFA is possible for both finite language and regular infinite language.

(d) There exist only 1 unique DFA for every regular language.

[NAT]

5. How many states required to design a minimal DFA for L = {X ba | X ∈ {a, b} *}? _____

[NAT]

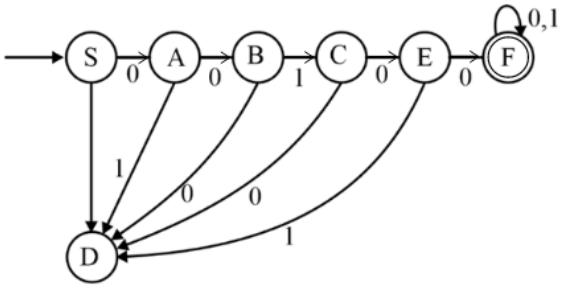
6. Number of final states required to design a minimal DFA for L = {$(\in + b + a)^2$ | Σ = {a, b}} is / are _____.

Answer Key

1. **(c)**
2. **(5)**
3. **(d)**
4. **(a, c, d)**
5. **(3)**
6. **(6)**

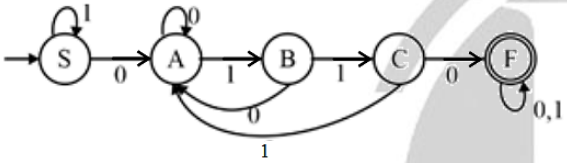
Hints and solutions

1. (c)



Number of states = 7.

2. (5)

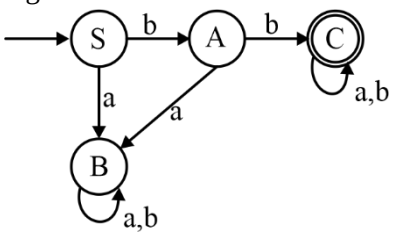


Number of States = 5.

3. (d)

- Every string does not start with bb is a complement of the language of starting with ab.
- To design complement of the DFA make non-final states and final. Final states make non-final.

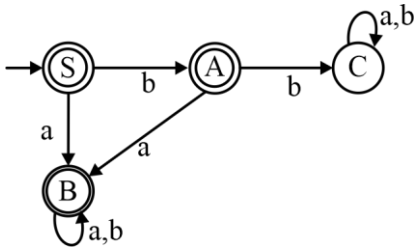
starting with bb:



Final states = {C}

Non final states = {S, A, B}

⇓ complement of above DFA



Final states = {S, A, B}

Non final states = {C}

Hence, option (d) is correct.

4. (a, c, d)

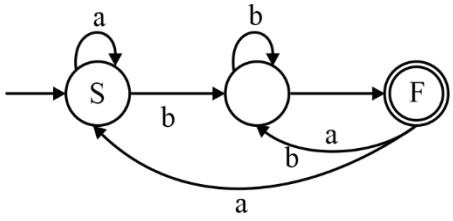
- If language is regular, there exist 1 unique DFA (Minimal DFA).
- If language is non-regular, DFA design not Possible.
- Regular language can be finite or infinite.
- Minimal DFA (Unique DFA) possible for every regular language.

Hence, statement (a, c, d) are correct.

5. (3)

L = {Xba | X ∈ {a, b} *}

L = set of all strings where every string ends with 'ba'.



Number of states = 3

6. (6)

L = {(∈ + a + b)^2}

L = {∈, aa, ab, ba, bb, a, b}

Minimal DFA Design: