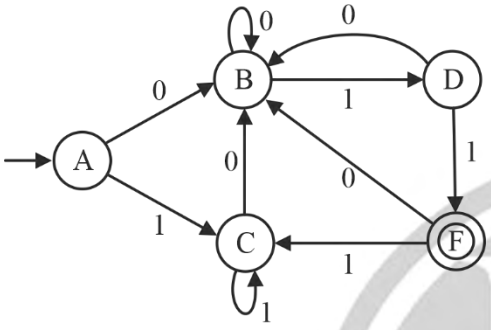
Branch : CSE & IT Batch:Hinglish

Theory of Computation

Regular Languages & Non Regular Languages DPP-02

[MCQ]

1. Consider the following DFA over $\Sigma = \{0, 1\}$



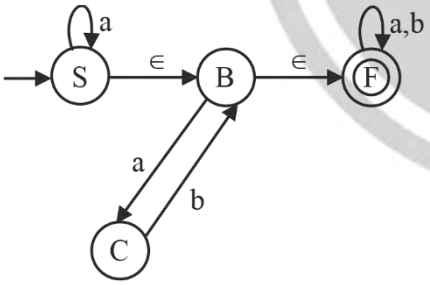
How many states are required in minimal DFA?

(a) 3 (b) 2

(c) 4 (d) 5

[MCQ]

2. Consider the following epsilon NFA:



What is the set of reachable states for the input string ba?

(a) {B, F}

(b) {F}

(c) {C, B, F}

(d) {S, B, F}

[MCQ]

3. For language (L) = {Xw |X = {ab}, w = {a, b}*}

How many states are required in NFA for above language (L)?

(a) 4

(b) 3

(c) 6

(d) None

[MSQ]

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

(a) Every DFA can be converted into equivalent NFA.

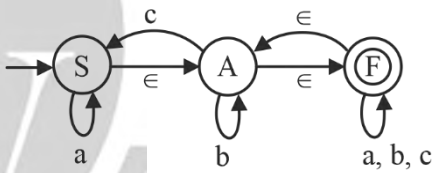
(b) Every DFA can be convert into equivalent ∈-NFA.

(c) Every NFA can be converted into equivalent minimal DFA.

(d) NFA with ∈-moves is not equivalent to NFA without epsilon move.

[MSQ]

5. Consider the following ∈-NFA:



Which of the following is/are correct regular expression for above ∈-NFA?

(a) $a^*b^* (a + b)^*$

(b) $(a + b + c)^*$

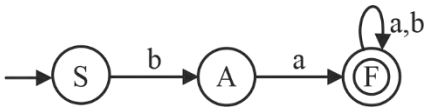
(c) $a^*b^+c^+(a + b + c)^*$

(d) $a^*b^*c^*(c + a + b)^*$

[MCQ]

6. Consider the following finite state automaton (M)

M:



Let $\overline{M}$ be the modified automaton obtained from M by interchanging finals and non-finals. If language accepted by above automaton is L(M), then the language accepted by $L(\overline{M})$ will be:

(a) $L(\overline{M}) = \{a(a + b)^*, (bb) (a + b)^*, \in\}$

(b) $L(\overline{M}) = \{\in, b\}$

(c) $L(\overline{M}) = \{\text{not starting with 'ba'}\}$

(d) $L(\overline{M}) = \text{none of these}$

[NAT]

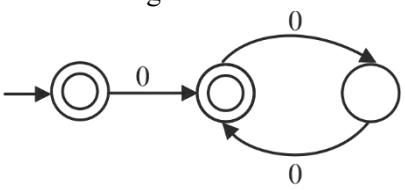
7. Given a language L, define L′ as follows:

$L^0 = \{\in\}$

$L^i = L^{i-1}. \forall_{i>0}$

The order of a language L is defined as the smallest k such that $L^k = L^{k+1}$.

Consider the language L_1 (over alphabet 0) accepted by the following automaton.



The order of L_1 is _____.

Answer Key

1. **(c)**
2. **(b)**
3. **(b)**
4. **(a, b, c)**
5. **(b, d)**
6. **(b)**
7. **(2)**

Hints and Solutions

1. (c)

0 equivalent:

{A, B, C, D} {F}

Non-final states Final state

1 equivalent:

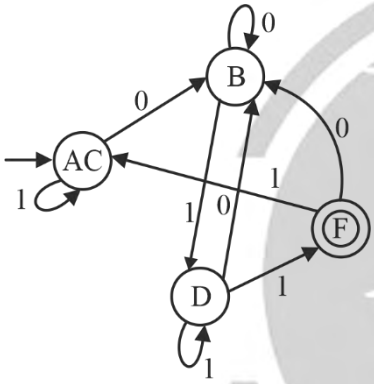
{A, C} {B} {D} {F}

2 equivalent:

{A, C} {B} {D} {F}

Number of states = 4

Minimized DFA



2. (b)

$\delta^*(S, ba) = \{F\}$

Hence, option (b) is correct.

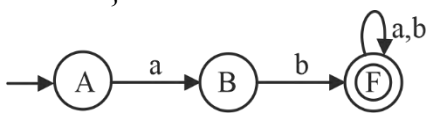
3. (b)

$L = \{Xw \mid X = \{ab\}, w = \{a, b\}^*\}$

$L = ab(a + b)^*$

= {start with ab}

NFA =



Number of states = 3

4. (a, b, c)

DFA ≅ NFA ∈ ≅-NFA

Hence, option (a, b, c) are correct.

5. (b,d)

$L = \{\in, a^*, b^* c^*, (a + b + c)^* \ldots\}$ L

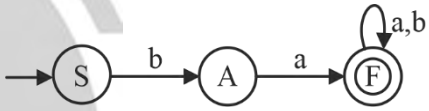
$= (a + b + c)^*$

$a^*b^*(a + b + c) = \in \cdot \in (a + b + c)^*$

$= (a + b + c)^*$ Hence, option (b, d) are correct.

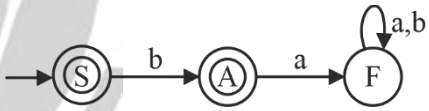
6. (b)

M:



$L(M) = ba(a + b)^*$

$\bar{M}$:



$L(\bar{M}) = \{b, \in\}$

Hence, option (b) is correct.

7. (2)

Smallest value of k = 2