Branch : CSE & IT   Batch:Hinglish
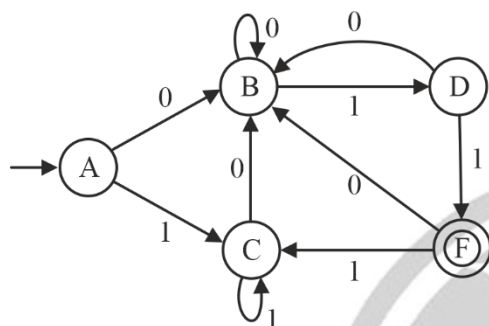
Theory of Computation
Finite Automata – Epsilon NFA | DPP-08 |

[MCQ]

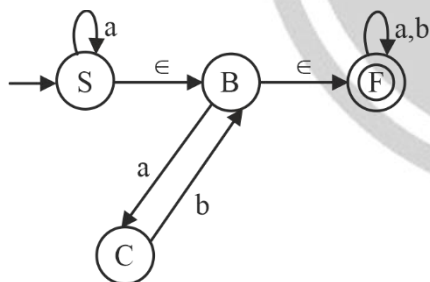**1.** Consider the following DFA over Σ ={0, 1}

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)?
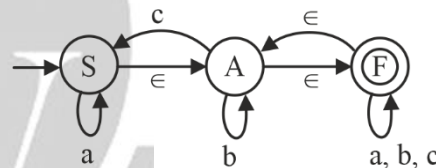
(a) 4

(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.

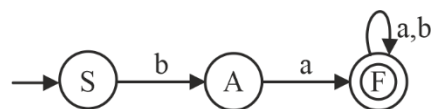**[MSQ]**

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

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

[NAT]

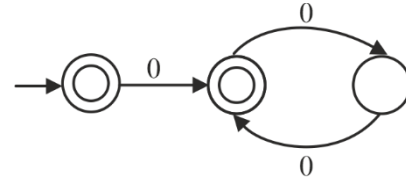**7.** Given a language L, define L′ as follows:

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

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

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}

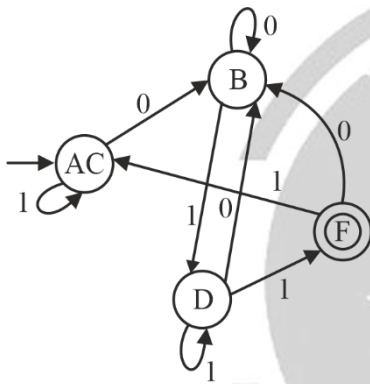Non-final states   Final state

1 equivalent:

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

2 equivalent:

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

Number of states = 4

Minimized DFA

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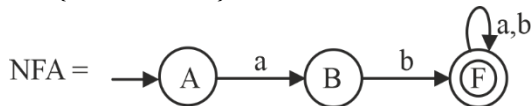
$\delta^*(S, ba) = \{F\}$

Hence, option (b) is correct.

3. **(b)**

L = {Xw |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 = { ∈, a*, b* c*, (a + b + c)* … } L

= (a + b + c)*

a*b*(a + b + c) = ∈·∈ (a + b + c)*

= (a + b + c)* Hence, option (b, d)

are correct.

6. **(b)**

M:
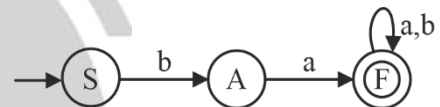
L(M) = ba(a + b)*

M̄ :
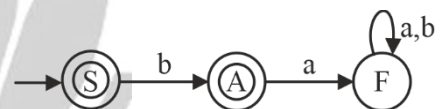
L(M̄) = {b, ∈}

Hence, option (b) is correct.

7. **(2)**

Smallest value of k = 2