## 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  $\Sigma = \{0,1\}$ , 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

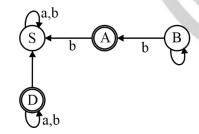
#### [NAT]

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

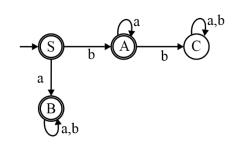
[MCQ]

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

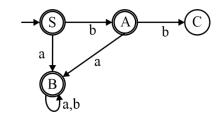
(a)



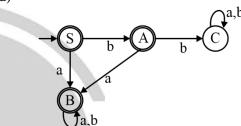
(b)



(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  $L = \{X \text{ ba } | X \in \{a, b\} *\}?$ 

[NAT]

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

## **Answer Key**

1. (c)

2. (5)

3. (d)

4. (a, c, d)

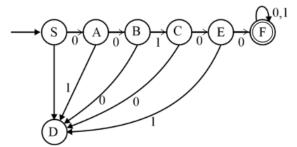
**5.** (3)

6. (6)



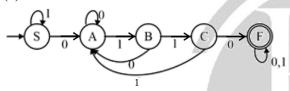
### **Hints and solutions**

1. (c)



Number of states = 7.

2. (5)

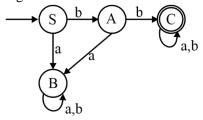


Number of States = 5.

#### 3. (d)

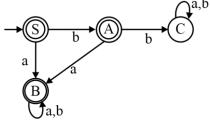
- Every string does not start with bb is a complement of the language of starting with ab.
- To design complement of the DFA make non-final states and final. Final states make non-final.

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)

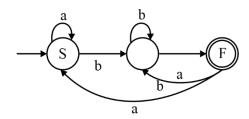
- If language is regular, there exist 1 unique DFA (Minimal DFA).
- If language is non-regular, DFA design not Possible.
- Regular language can be finite or infinite.
- Minimal DFA (Unique DFA) possible for every regular language.

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

5. (3)

$$L = \{Xba \mid X \in \{a, b\} *\}$$

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



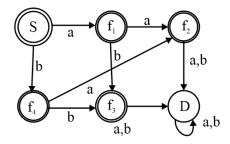
Number of states = 3

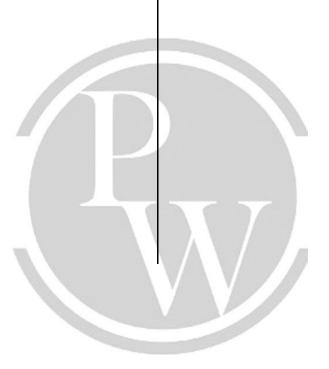
**6.** (6)

$$L = \{(\in +a+b)^2\}$$

 $L = \{ \in, aa, ab, ba, bb, a, b \}$ 

Minimal DFA Design:





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