

ASSIGNMENT-5

DISCRETE STRUCTURE

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SOLUTIONS

Qus-1 :

Given, $M = \{S, I, q_0, f_s, F\}$

$S = \{q_0, q_1, q_2, q_3\}$

$I = \{a, b\}$

$F = \{q_1\}$

$q_0 = \text{initial state}$

① state transition function (f_s) :-

$$f_s(q_0, a) = q_1$$

$$f_s(q_0, b) = q_2$$

$$f_s(q_1, a) = q_3$$

$$f_s(q_1, b) = q_2$$

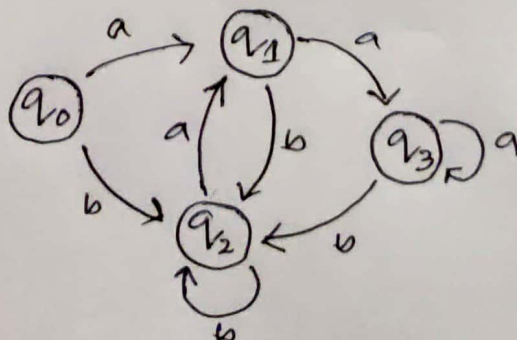
$$f_s(q_2, a) = q_1$$

$$f_s(q_2, b) = q_2$$

$$f_s(q_3, a) = q_3$$

$$f_s(q_3, b) = q_2$$

State transition diagram :-



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DFA helps to determine the validity of the password by detecting with the password of a specific email address. Thus, to match the characters of the password of the email address, DFA can be applied for verification.

Qus-2:

(i) Transition Table:-

	a	b
s_0	s_2	s_1
s_1	s_3	s_1
s_2	s_4	s_3
s_3	s_3	s_3
s_4	s_2	s_3

QUS-2 :

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(a) $w = aaaaaa$

Now,

$$s(s_0, a) \rightarrow s_2, \quad s(s_2, a) \rightarrow s_4$$

$$s(s_4, a) \rightarrow s_2, \quad s(s_2, a) \rightarrow s_4$$

$$s(s_4, a) \rightarrow s_2, \quad s(s_2, a) \rightarrow s_4$$

∴ The input cannot be accepted by the DFA.

(b) $w = ababab$

$$s(s_0, a) \rightarrow s_2, \quad s(s_2, b) \rightarrow s_3$$

$$s(s_3, a) \rightarrow s_3, \quad s(s_3, b) \rightarrow s_3$$

$$s(s_3, a) \rightarrow s_3, \quad s(s_3, b) \rightarrow s_3$$

The final state is s_3 . Thus, the input can be accepted by DFA.

Q → 3

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① here,

$$S = \{s_0, s_1, s_2, s_3, s_4, s_5\}$$

$$I = \{0, 1\}$$

s_0 = initial state $\rightarrow \{s_0\}$

$F = \{s_0, s_1, s_5\} \rightarrow$ final states. **Ans!**

② input string $\rightarrow 0011101100$

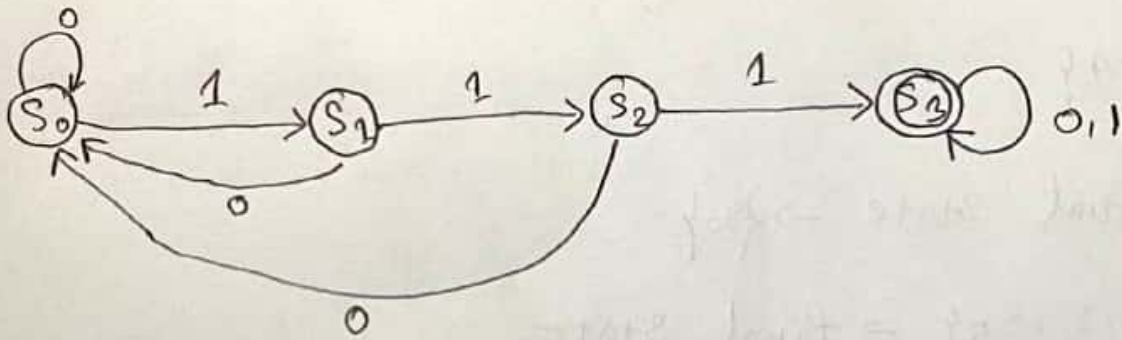
$$s_0 \xrightarrow{0} s_0 \xrightarrow{0} s_0 \xrightarrow{1} s_1 \xrightarrow{1} s_2 \xrightarrow{1} s_3 \xrightarrow{0} s_5 \xrightarrow{1} s_5 \xrightarrow{1} s_5 \xrightarrow{0} s_4 \xrightarrow{0} s_4$$

here,

s_4 is not the final state so, the string 0011101100 is not accepted.

iii DFA that accepts the set of all bit string that contain three consecutive 1s.

given below.



here, DFA is,

$$M = \{ \{S_0, S_1, S_2, S_3\}, \{0, 1\}, \{S_0\}, f, \{S_3\} \}$$

Ans!

Ans to the Q.N-4

The game is designed in a way where the game goes into three states, which are EVADE, WANDER AND ATTACK. Once the gamer encounters with the ~~an~~ enemies where he goes from one state to other state. The state to which he goes, it depends on whether the gamer is vulnerable or not. Based on the restriction given. ~~to~~ Here the actions are performed and a finite state diagram is drawn which describes the entire scenario.

Here is the explanations given below.

states

1. ATTACK: The hero keeps attacking in this state.
2. EVADE: In this the hero tries to to save himself from the enemies
3. WANDER: In this ~~a~~ state hero keeps wandering the battle field

Action

1. Shoot: if the hero encounters enemies. then he immediately shoots them.
2. Not shoot: if the hero is in vulnerable condition. then he shoots only to save himself, otherwise he remains calm.

Ans to the Q N-5

