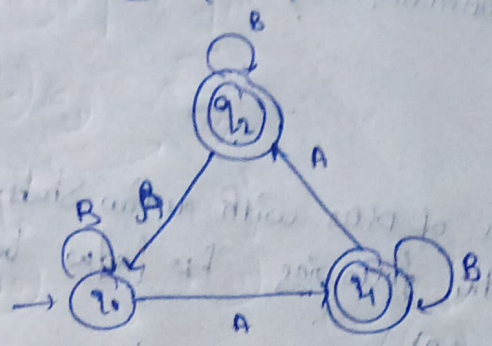
2300030207 FTOC - A1 Home Assignment -1

(1) Consider the following State diagram of a DFA H using alphabet $\Sigma = \{A, B\}$




(a) Starting State of H is $q_0$

(b) accepting States are $q_0$, $q_1$

(c) $H = \{Q, \Sigma, \delta, q_0, F\}$

Q is finite set of States

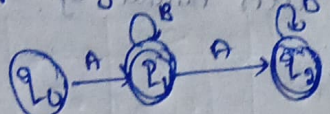
$\Sigma$ alphabet

$\delta$ transition function ($\delta: Q \times \Sigma \to Q$)

$q_0$ is initial State

$F \subseteq Q$ is the set of accept States

(d) For Language ABBAB




(e) NO, the string ABBAA machine won't accepts at last transition 'A' goes to non-final state.

(f) given string ABABAA

yes, this string accepted by machine

(1) the language recognized by M

It is not possible for i multiple of 3's from the given dfa

Ex:- {AAA,, AAAAAA, ...}

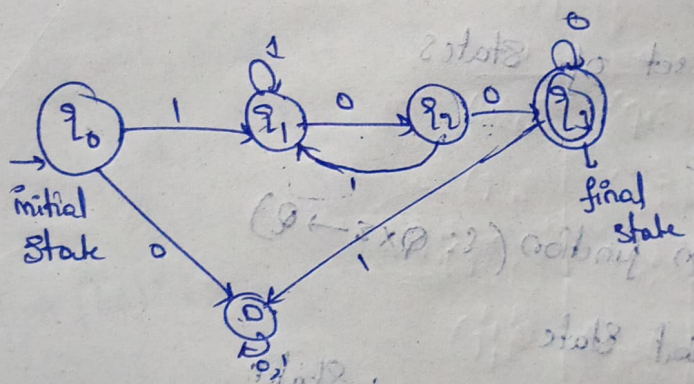
not possible.

(2) Give state diagrams of DFAs with as few states as you can recognizing the following $L_1$ = {w/w begins with 1 and Ends with 00}.

Sol:- $L = \{100, 1100, 1000, \ldots\}$

So, we Require 4 States

let states be $q_0, q_1, q_2, q_3$

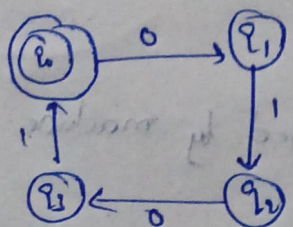



(3) Give state diagrams of NFAs with as few states as you can recognize the language

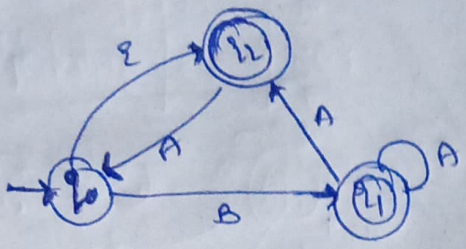
$L_2$ = {w/w contains an Even number of occurrences of the substring 01}

Sol:- $\Sigma = \{0, 1\}$

$L = \{\epsilon, 0101, 01010101, \ldots\}$



④ Convert the following NFA to an Equivalent regular Expression.




Sol:- first of all we need to make ε-free NFA then we can convert it into DFA.

Step 1:- Epsilon closure $(q_0) = \{q_0, q_2\}$

Epsilon closure $(q_1) = \{q_1\}$

Epsilon closure $(q_2) = \{q_2\}$

Step 2:- Extended transition function

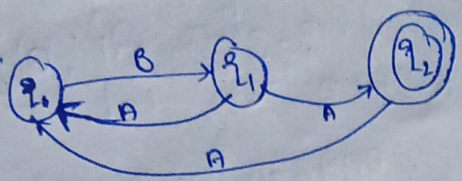
$\delta'(q_0, a) = \epsilon\text{-closure}(\delta(\epsilon\text{-closure}(q_0), a))$

$\epsilon\text{-closure}(\delta(q_0, a))$

$\epsilon\text{-closure}(q_1)$

$\Rightarrow \{q_1\}$

| | A | B |
|---|---|---|
| $q_0$ | $\phi$ | $q_1$ |
| $q_1$ | $q_1 q_2$ | $\phi$ |
| $q_2$ | $q_0$ | $\phi$ |




$q_0 \Rightarrow q_1 \cdot A + q_2 \cdot A$

$q_1 \Rightarrow q_0 \cdot B$

$q_2 \Rightarrow q_1 \cdot A$

$\therefore \Rightarrow q_0 \Rightarrow q_1 \cdot A + q_1 \cdot A \cdot A$

$= q_1 \cdot A(\epsilon + A)$

$\Rightarrow q_1 \cdot A^* A$

$\Rightarrow q_1 \cdot A^+$

$\left\{ R^* \cdot R = R^+ \right.$ by formula