Part - A.

1. Applications of TOC:

⇒ Compiler Design.

⇒ Robotics

⇒ Artifical Intellegence

⇒ Knowledge Engineering.

2. Language Acceptor:

In finite automata, it has a input of regular language or a conveying language. It has a regular expression. That checks the input is acceptable or not by the language acceptor or recognizer. It cant performs the operations.

Eg: Compiler design.

3. Difference DFA & NFA.

DFA :

Deterministic Finite automata, it has each state and each ~~s~~ input symbol the tranition state is exactly only one.

δ ~~of~~ a set of ~~stat~~ transition state

$Q \times \Sigma = 2Q$, It is a set of state. and a set of transition state.

NFA :

Non Deterministic Finite ~~a~~ automata it has one or more transition state in symbols. It's independent.

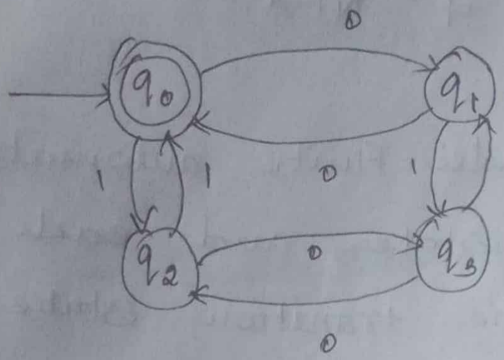
The set of transition state δ and a subset is p.

$$Q \times \Sigma = 2^{q}$$

The initial state for both NFA and DFA is q_0.

4. All ~~NA~~ DFA's are NFA's. The statement is true. Because DFA has only one transition state but NFA has more no of ~~s~~ transition and one also. So it's true.

5.



$x = 0011$

$\delta(q_0, x)$

$\delta(q_0, x) = ?$

$\delta(q_0, 0) = q_1$

$\delta(q_1, 0) = q_0$

$\delta(q_0, 1) = q_2$

$\delta(q_2, 1) = q_0$

it reaches the final state.
so, it's accepted.

Part - B:

$M = (\{q_0, q_1\}, \{0,1\}, \phi, q_0, \{q_2\})$

δ :

	0	1
q_0	$\{q_0, q_1\}$	$\{q_1\}$
q_1	ϕ	$\{q_0, q_1\}$
q_2	$\{q_1, q_2\}$	$\{q_0, q_2\}$

use [ ].

	0	1
$[q_0]$	$[q_0, q_1]$	$[q_1]$
$[q_1]$	ϕ	$[q_0, q_1]$
$[q_2]$	$[q_1, q_2]$	$[q_0, q_2]$
$[q_0, q_1]$	$[q_0, q_1]$	$[q_0, q_1]$
$[q_1, q_2]$	$[q_1, q_2]$	$[q_1, q_2, q_3]$
$[q_0, q_2]$	$[q_0, q_1, q_2]$	$[q_0, q_1, q_2]$
$[q_0, q_1, q_2]$	$[q_0, q_1, q_2]$	$[q_0, q_1, q_2]$.
$[\phi]$	$[\phi]$	$[\phi]$

$\delta([q_0, q_1], 0) = ?$

$\delta(\{q_0, q_1\}, 0) = \delta(\{q_0, 0\} \cup \{q_1, 0\})$

$= \{q_0, q_1\} \cup \{q_0, q_1\}$

$= \{q_0, q_1\}$

$\delta([q_0, q_1]) = [q_0, q_1]$.

$\delta([q_0, q_1], 1) = ?$

$\delta(\{q_0, q_1\}, 1) = \delta(\{q_0, 1\} \cup \{q_1, 1\})$

$= \{q_1\} \cup \{q_0, q_1\}$

$= \{q_0, q_1\}$

$\delta([q_0, q_1], 1) = [q_0, q_1]$.

$\delta([q_1, q_2], 0) = ?$

$\delta(\{q_1, q_2\}, 0) = \delta(\{q_1, 0\} \cup \{q_2, 0$

$= \delta\ \{\phi\} \cup \{q_1, q_2\}$

$= \{q_1, q_2\}$

$\delta([q_1, q_2], 0) = [q_1, q_2].$

$\delta([q_1, q_2], 1) = ?$

$= \delta(\{q_1, 1\} \cup \{q_2, 1\})$

$= \{q_0, q_1\} \cup \{q_0, q_2\}$

$= \{q_0, q_1, q_2\} \Rightarrow [q_0, q_1, q_2]$

$\delta([q_1, q_2], 1) = [q_0, q_1, q_2].$

$\delta([q_0, q_2], 0) = ?$

$= \delta(\{q_0, 0\} \cup \{q_2, 0\})$

$= \{q_0, q_1\} \cup \{q_1, q_2\}$

$= \{q_0, q_1, q_2\}.$

$= [q_0, q_1, q_2].$

$\delta([q_0, q_2], 1) = ?$

$= \delta(\{q_0, 1\} \cup \{q_2, 1)$

$= \delta \{q_1\} \cup \{q_0, q_2\}$

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

$\delta([q_0, q_2], 1) = [q_0, q_1, q_2]$

$\delta([q_0, q_1, q_2], 0) =$

$\delta(\{q_0, 0\} \cup \{q_1, 0\} \cup \{q_2, 0\})$

$= \{q_0, q_1\} \cup \{\phi\} \cup \{q_1, q_2\}$

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

$\delta([q_0, q_1, q_2]) = [q_0, q_1, q_2]$.

$\delta([q_0, q_1, q_2], 1) = ?$

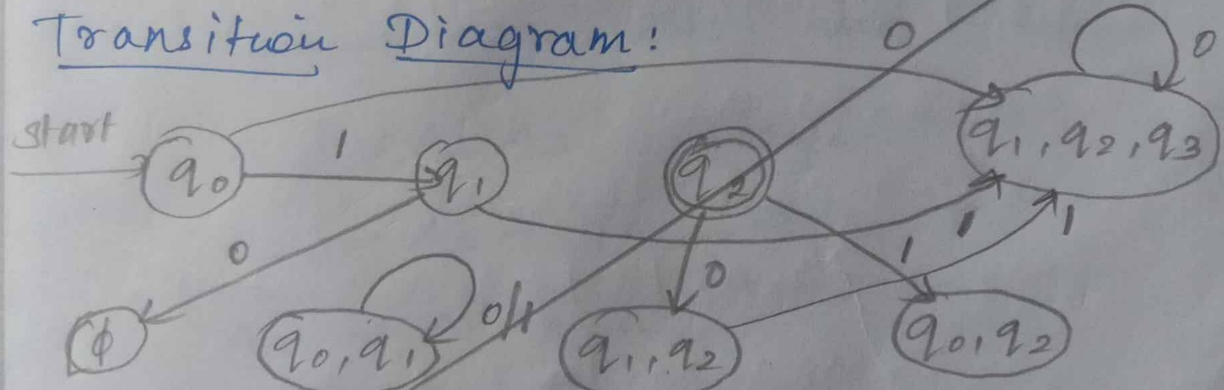
$= \delta\{q_0, 1\} \cup \{q_1, 1\} \cup \{q_2, 1\}$

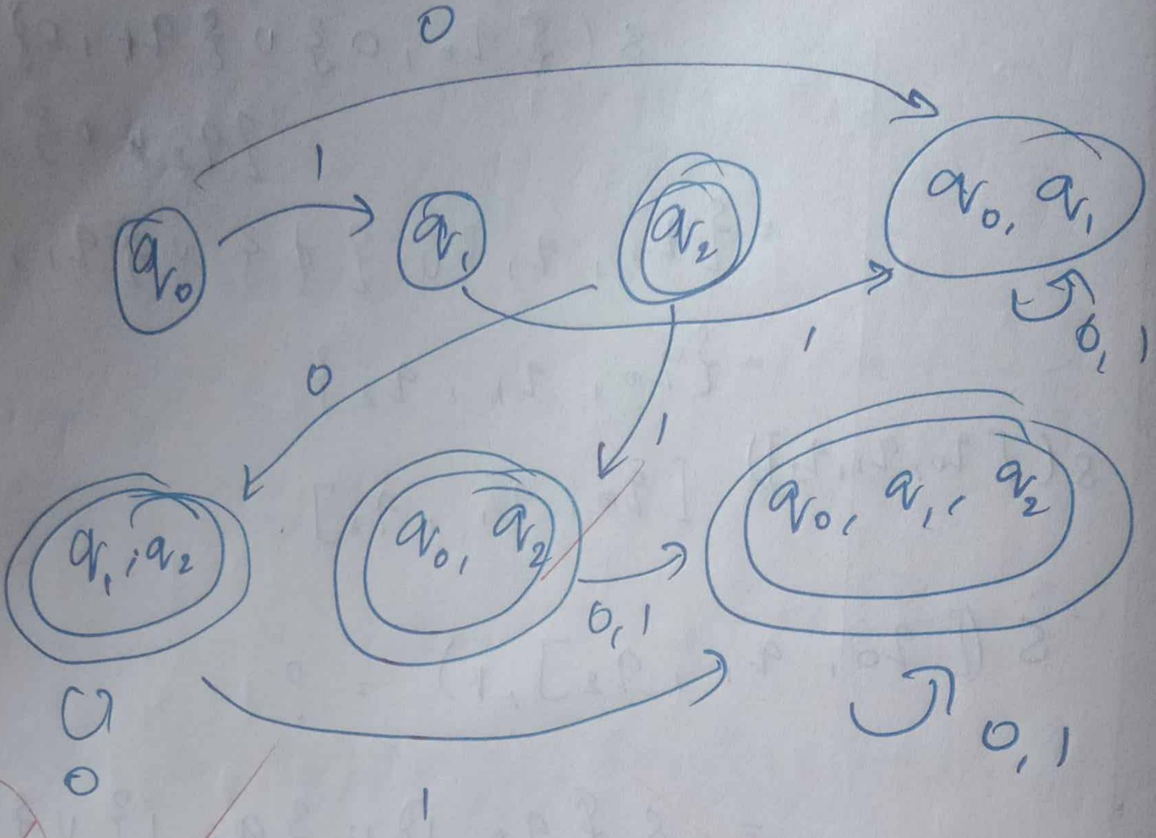
$= \{q_1\} \cup \{q_0, q_1\} \cup \{q_0, q_2\}$

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

$\delta([q_0, q_1, q_2]) = [q_0, q_1, q_2]$.

Transition Diagram:





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