Tutorial - 1

PRN: 2015BCS041

Theory of Computation.

Q.1 What are the appl's of finite automata?

→ String Processing:

finding occurrences of a pattern string in a long string.

for generating finite state Mechanics :

A finite state mechanics is on FA with actions on the arcs.

for generating state charts :

State charts model tasks as a set of states and actions.

for lexical analysis:

Parsing of source code, generating tokens from source code and lexical analysis of it requires use of RE & FA.

Filtering for strings :

RE are usually used in software industry to filter long string or match parts of strings.

Q.2 What is Automata Theory?

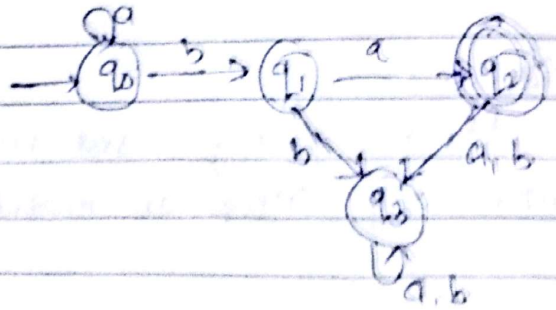
→ Automata theory is a branch of computer science that deals with designing abstract self propelled computing devices that follow a pre-determined sequence of operations automatically. An automata with finite no of steps is called as an finite automata.

Q.3. What are the types of proof?

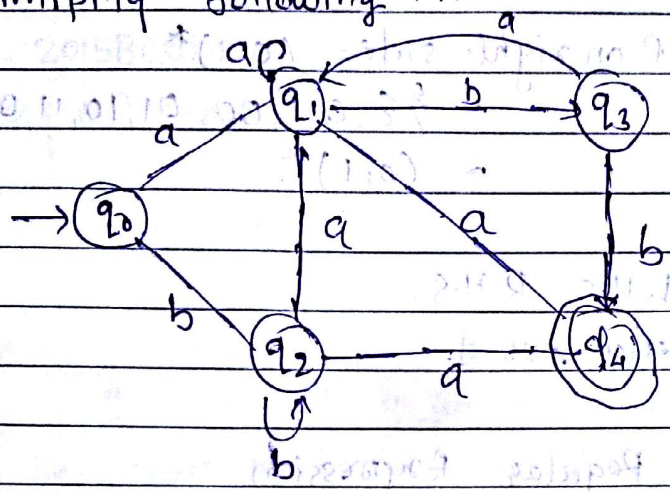
→ There are 4 different types of proofs:
(a) Direct proof (constructive proof).
(b) Proof by contrapositive.
(c) Proof by contradiction.
(d) Proof by mathematical induction.

Q.4. How will you design FA for a*ba?

→ Given RE = a*ba
L = { ba, aba, aaba, aaaba ... }



Q.5. Simplify following FA



→

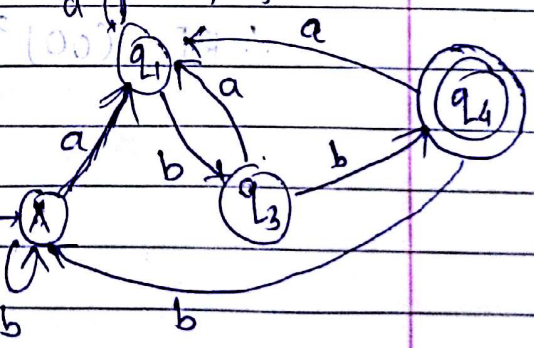
	a	b
q_0	q_1	q_2
q_1	q_1	q_3
q_2	q_1	q_2
q_3	q_1	q_4
q_4	q_1	q_2

Similar;

let $A = q_0, q_2$

	a	b
A	q_1	A
q_1	q_1	q_3
q_3	q_1	q_4
q_4	q_1	q_A

Simplified FA



Q.6. Prove that : $(0+1)^* 01 (01+1)^* + (1+0^*) = (0+1)^*$

→ RE on left side $= (0+1)^* 01 (0+1)^* + (1^* 0^*)$

$= \{\varepsilon, 0, 1, 00, 01, 10, 11, 000, 0001 \cdots\}$

$= (0,1)^*$

now,

RE on right side = $(0+1)^*$

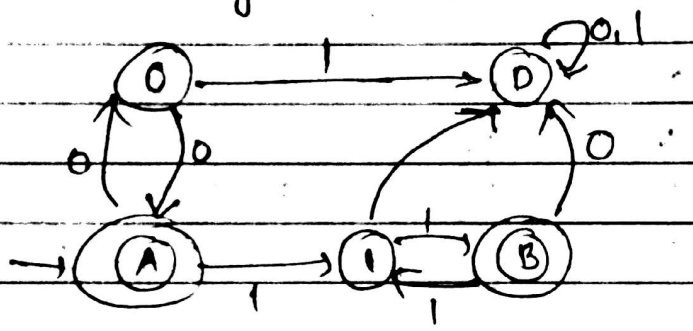
$= \{\varepsilon, 0, 1, 00, 01, 10, 11, 000 \ldots\}$

$= (0,1)^*$

$\therefore$ L.H.S = R.H.S.

Hence, proved.

Q.7. Find Regular Expression



→ $L = \{\varepsilon, 00, 11, 0000, 0011, 1111, 000000, \ldots\}$

$\therefore RE = (00)^*(11)^*$