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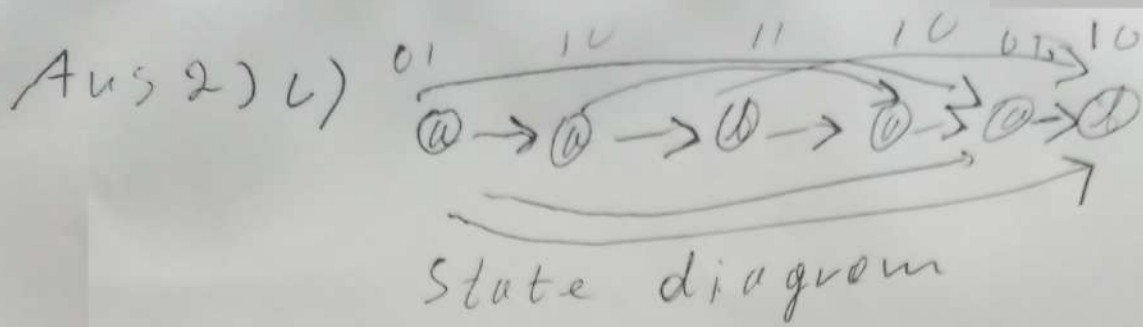
Ans 1) a) Automata are abstract self propelled computing device which follows a predetermined sequence of operations automatically.

Ans 1) b) DFA stands for ~~the~~ deterministic Automata. NFA stands for Non deterministic Automata. DFA has a unique transition from each state to every input. In contrast NFA allows for multiple possible following states based on the current input.

Ans 1) c) Turing machines are similar to finite automata / finite state machines but have advantage of unlimited memory. A Turing machine will be defined as a DFA with memory.

Ans 2) a) The pigeonhole principle is that if more objects are put into fewer containers than the number of objects, at least one container must contain more than one object. Letter box is a technique for displaying a wide-screen film or landscape video on a narrower screen by reducing its size but retaining the aspect ratio, with black bands filling the screen above and below the picture, compare pan and scan piler box.

Ans 2) b) 1) Q is a finite set of state
2) Σ is a finite set of symbol (the alphabet)
3) $\delta: Q \times \Sigma \rightarrow Q$ is the transition function,
4) $q_0 \in Q$ is the start state, and
5) $F \subseteq Q$ is the set of accept states
in M (A finite Automaton).



a	0
a	1
b	1
0	1
4	0
b	1

State table.

Aus 3) a) DFAs are used in network routing, database design and compiler design.

Aus 3) b) The class of regular languages is closed under the union operation also the class of regular languages over fixed alphabet Σ is closed under the union operation.

Proof let A_1, A_2 be any two regular languages over Σ

Then $A_1 \cup A_2$ is regular

Aus 3) c) $a = 2k$ is true and every integer is even and greater than odd and also is positive.