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Subject: Theory of Automata

Department: Computer Science

Submitted TO:

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ONO1: What is DFA? Represent With the help of transitions and transition table.

DFA refers to deterministic finite automata. Deterministic refer to the uniqueness of the computation. DFA there is only path for specific input from the current position to the next. DFA does not accept the null move.

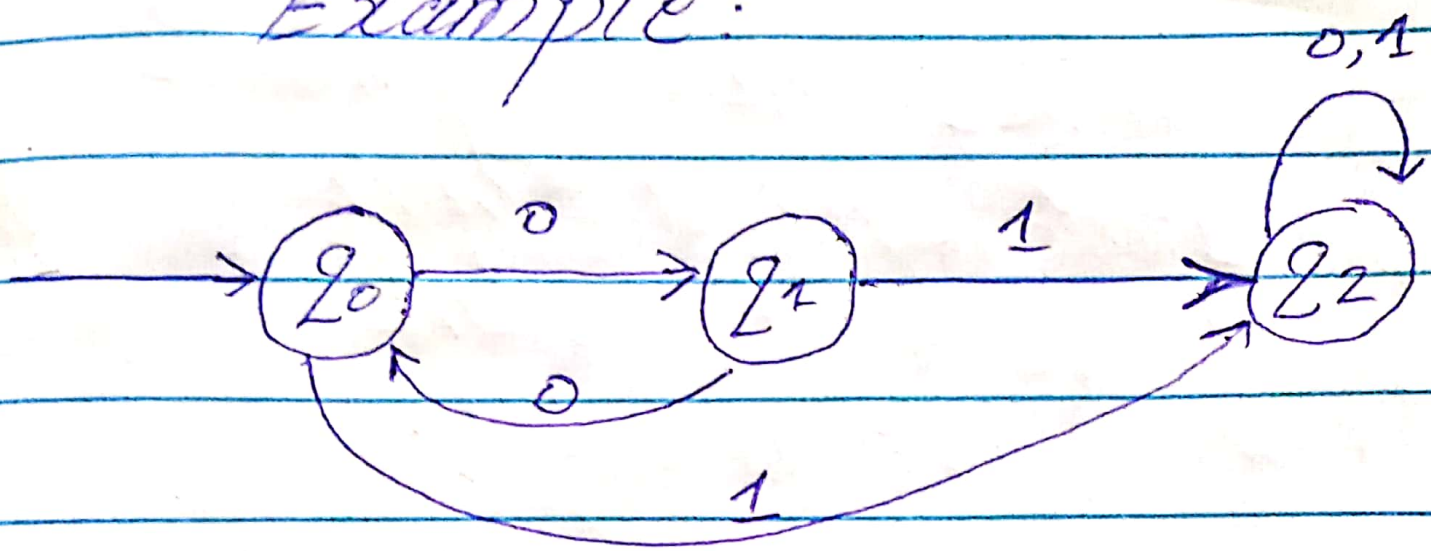
A transition diagram or state transition diagram is a directed graph which can be constructed as follows. A transition table is basically a tabular representation of transition function

it takes two arguments (a state and a symbol) and returns a state (the next state).

A transition table is represented by the following things.

- Column corresponded to input symbol.
- Rows corresponded to state.
- Entries corresponded to the next state.
- The start state is denoted by an arrow with no source.
- The accept state is denoted by a star.

Example:



Transition table of given DFA is follows.

present state	Next state for inp 0	Next state for inp 1
→ q_0	q_1	q_2
q_1	q_0	q_2
* q_2	q_2	q_2

Question NO2:
Construct a regular expression and correspondingly an FA for all strings that ended in a double Letter.

Ans The regular expression is as follows:

(i) $(a+b)^*(aa+bb)$

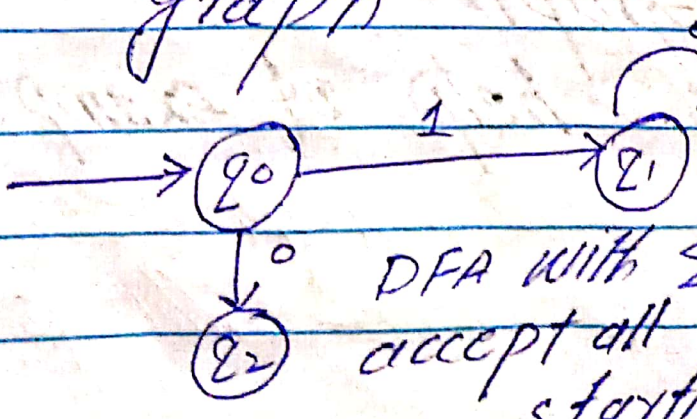
(ii) $(a+b)^*(ab+ba)+a+b+\wedge$

Question NO:3
Differentiate between transition Graph and Generalized transition Graph with the help of example.

Ans) A transition graph consist of three things.

* A finite set of state, at least one of which is designated the start state and some of which is designated as final state.
* An alphabet Σ of possible input symbol from which the input string are formed.
* A finite set of transition that shows the change of state from the given state on given input.

Example of transition graph



DFA with $\Sigma = (0, 1)$ accept all string starting with 1.

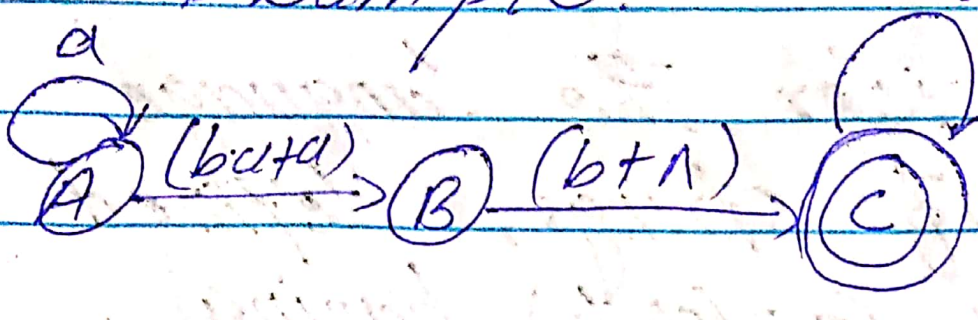
The Finite automata can be represented using transition graph. In above diagram the machine initially at start point q_0. Then receiving input 1 the machine change the state to q_1. From q_0 on receiving 0, the machine change its state to q_2. which is the dead state. from q_1 on receiving input 0, 1 the machine change its state to q_1. which is the Final state. The possible input strings that can be generated are 10, 11, 110, 111 that means all strings start with 1.

(2) Generalized Transition Graph

A generalized transition graph defined by a 5-tuple are follows.

* A finite set of state.
* A finite set of input symbol.
* A non empty set of start states, $S \subseteq$
* A set of final accepting states $F \subseteq$
* A finite set, δ of transition, (directed edge lables) (u, s, v) where u, $v \in Q$ and s regular expression over Σ.

Example.



Generalized transition graph accept all strings without a doubled b.

Note that the word containing the single letter b can take free ride along the Λ-edge from start to middle and then have letter b read to reach the final state.

The first edge should be labeled (b+a+a) as in the diagram above not (ab+a)

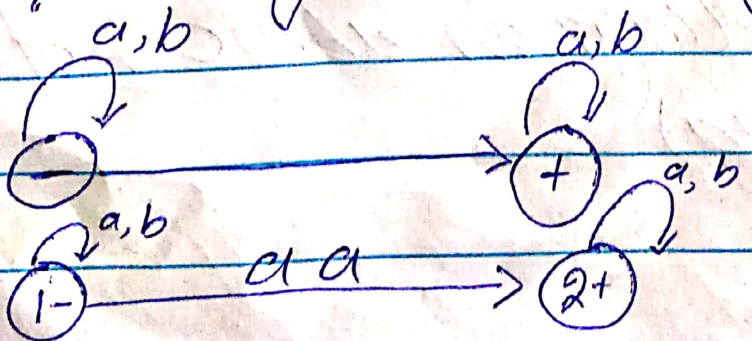
ON04:

Consider the language L of strings, defined over G = (a, b) having double a or double Draw its transition Graph.

Ans The Language L Can be expressed.

$$(a+b)^*(aa+bb)(a+b)^*$$

The above language also expressed by the following transition graph.



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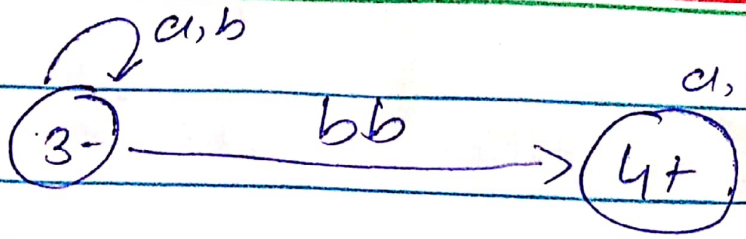
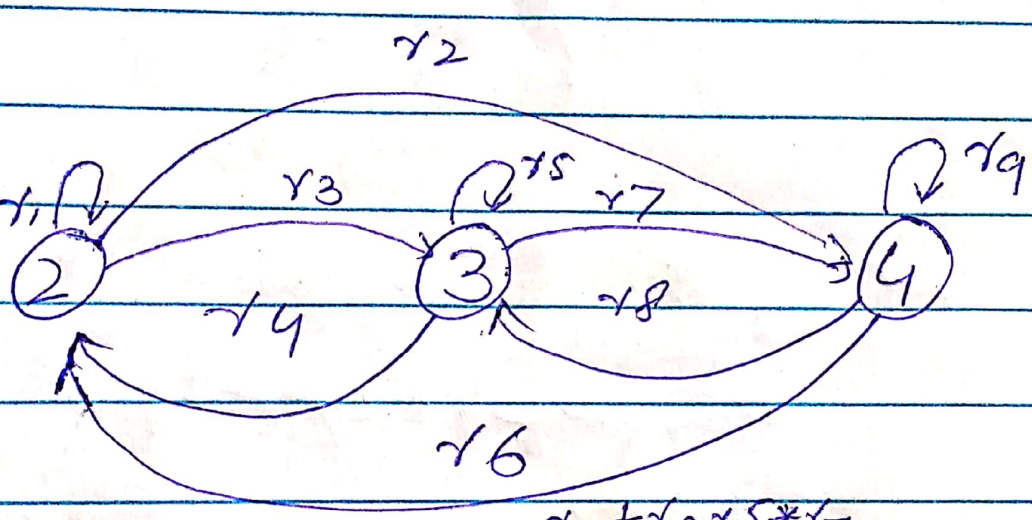


Question No5:
Solve The Following TG By Kleen's Theoram.



Ans