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Department of Computer Science & Engineering

Assignment

Subject: Automata Theory & Computability

Subject Code: 18CS54

Sem: V

ASSIGNMENT QUESTION

Module 1
Why Study theory of computation, Language and String

1. Obtain DFAs to accept strings of a's and b's having exactly one a.

2. Obtain a DFA to accept strings of a's and b's having even number of a's and b's.

3. Give Applications of Finite Automata.

4. Write Regular expression for the following L = { $a^n b^m$: m, n are even} L = { a^n ,b^m : m>=2, n>=2}.

5.

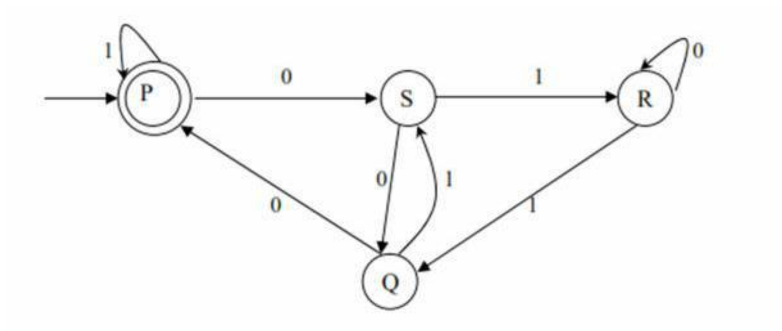
δ		a	b
p	{r}	{q}	{p,r}
q	I	{p}	I
*r	{p,q}	{r}	{p}

Convert above automaton to a DFA.

6. Convert following NFA to DFA using subset construction method.

δN	0	1
p	{p,r}	{q}
q	{r,s}	{p}
*r	{p,s}	{r}
*s	{q,r}	I

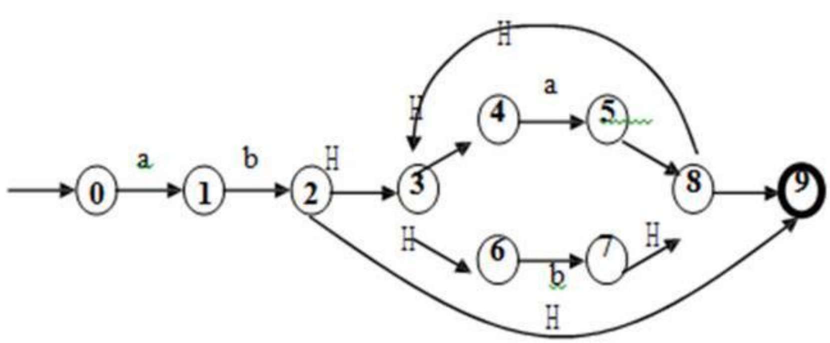
7. Convert the following DFA to Regular Expression



Module 2
Regular Expressions and Languages

1. P.T. Let R be a regular expression. Then there exists a finite automaton M = (Q,¦, G, q0, A) which accepts L(R).
2. Define derivation , types of derivation , Derivation tree & ambiguous grammar. Give example for each.
3. Obtainan NFA to accept the following language L={w|w abab^n or aba^n where n t 0}

4. Convert the following NFA to its equivalent DFA**(10m)(Dec- Jan 2011**) **(Jun-Jul 12)**



5. Define grammar? Explain Chomsky Hierarchy? Give an example **(6m)(June- July 2011)**

6. Is the following grammar ambiguous
S -> aB | bA

A -> aS | bAA |a
B -> bS | aBB | b

Module 3
CFG

1. P.T. If L and M are regular languages, then so is L⊂M.

2. Write a DFA to accept the intersection of L1=(a+b)*a and L2=(a+b)*b that is for L1 ˆL2.

3. Find the DFA to accept the intersection of L1=(a+b)*ab (a+b)* and L2=(a+b)*ba (a+b)* and that is for L1 ˆ L2
4. P.T. If L and M are regular languages, then so is L – M.

5. Design context-free grammar for the following cases L={ 0n1n | n≥l }

   L={aibjck| i≠j or j≠k}

6. Generate grammar for RE 0*1(0+1)*
7. P.T. If L is a regular language over alphabet S, then L = 6* - L is also a regular language.
8. Explain CGF with an example.

9. Explain decision properties of regular language.

Module 4

Context Free and Non Context Free Languages

1. Eliminate the n->n-generating symb->ls fr->m S -> aS | A | C, A ->a, B -> aa, C - > aCb.
2. Draw the dependency graph as given above. A is non-reachable from S. After eliminating A, G1= ({S}, {a}, {S -> a}, S).
3. Find out the grammar without H – Productions G = ({S, A, B, D}, {a}, {S o aS | AB, A -> H, B-> H, D ->b}, S).
4. Eliminate n->n-reachable symbols from G= ({S, A}, {a}, {S -> a, A ->a}, S)
5. Eliminate non-reachable symbols from S -> aS | A, A -> a, B -> aa.
6. Give leftmost and rightmost derivations of the following strings

   a) 00101 b) 1001 c) 00011
7. Construct DPDA which accepts the language L = {wcw^R | w {a, b}*, c Σ}.

Module 5
Turing Machine

1. Explain with example problems that Computers cannot solve.
2. Explain briefly the following Halting problem.
3. Explain Programming techniques for Turning Machines
4. Design a Turing machine to accept a Palindrome.
5. Design a TM to recognize a string of the form a^nb^{2n}.