Dronacharya College of Engineering, Gurgaon

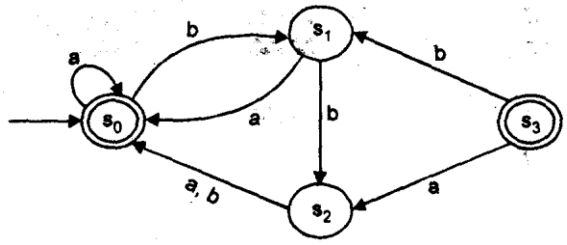
Department of Electronics and Computers Engineering

Subject: Theory of Automata Computation **(CSE-206-F)** **Semester: VI/ Branch:** ECS

Important Questions

Section A

1. Show that the regular expression (a+b)*a(a+b)*b(a+b)* is equivalent to (a+b)*ab(a+b)* in the sense that they define the same language.
2. Write all differences between deterministic and non-deterministic finite automata.
3. Construct a DFA equivalent to regular expression ba+(a+bb)a*b
4. Design a FSM with minimum states which accepts all strings over (a,b) such that number of a's is divisible by 2 & number of b's divisible by 3.
5. Determine whether all the strings in each of these sets are recognized by the deterministic finite-state automation given below.



(i) $\{a\}^*$ *(ii)* $\{a\}\{a\}^*$ *(iii)* $\{b\}\{a\}^*$
(iv) $\{ab\}^*$ *(v)* $\{a\}^*\{b\}^*$ *(vi)* $\{b\}\{a,b\}^*$

Section B

1. Find the language generated by the grammar

   S-> AB, A->A1/0, B->2B/3

2. How a NFA is converted to DFA ? Give example and explain.
3. Find a cfg that generate the following language over alphabet ∑=(a,b)
   a. all string that end in b and have an even number of b's in total
   b. all string of odd length
4. Convert the given grammer into GNF
   S->AB, A->BS/b, B->SA/a

5.Find a reduced grammar equivalent to the grammar G whose Productions are:

S→ AB
A→a
B→b
E→c

6. Explain CNF and its Lemmas in detail. Find a Grammar in CNF equivalent to the grammar
   S⟶ ⊐~S | [S) S] | p | q (S being the only variable)
7. Convert the following grammar in to Greibach Normal Form (GNF)
   S→aSa/bSb/a/b/aa/bb.
8. Explain the application of pumping lemma. Give suitable example.

Section C

1. Construct a PDA named A equivalent to the following context free grammar
   S->0BB,
   B->0S/1S/0
   Test whether $010^4$is in N(A).
2. Construct a PDA accepting the set of all even length palindromes over the {a,b} by empty store
3. Construct a turning machine that can accept set of all even palindromes over {0,1}
4. Design a T.M to recognize the language { $a^nb^nc^m$ | n,m>=1}
5. Describe the system for the pushdown automation. Also write purpose of pushdown automation.
6. Explain the basic model of Turing machine. Design a TM to accept language
   L={ WCW | W in $(a+b)^+$ }.

Section D

1. Write short notes on:
   a. Chomsky Hierarchy of a grammar.
   b. Halting Problem of Turing Machine.